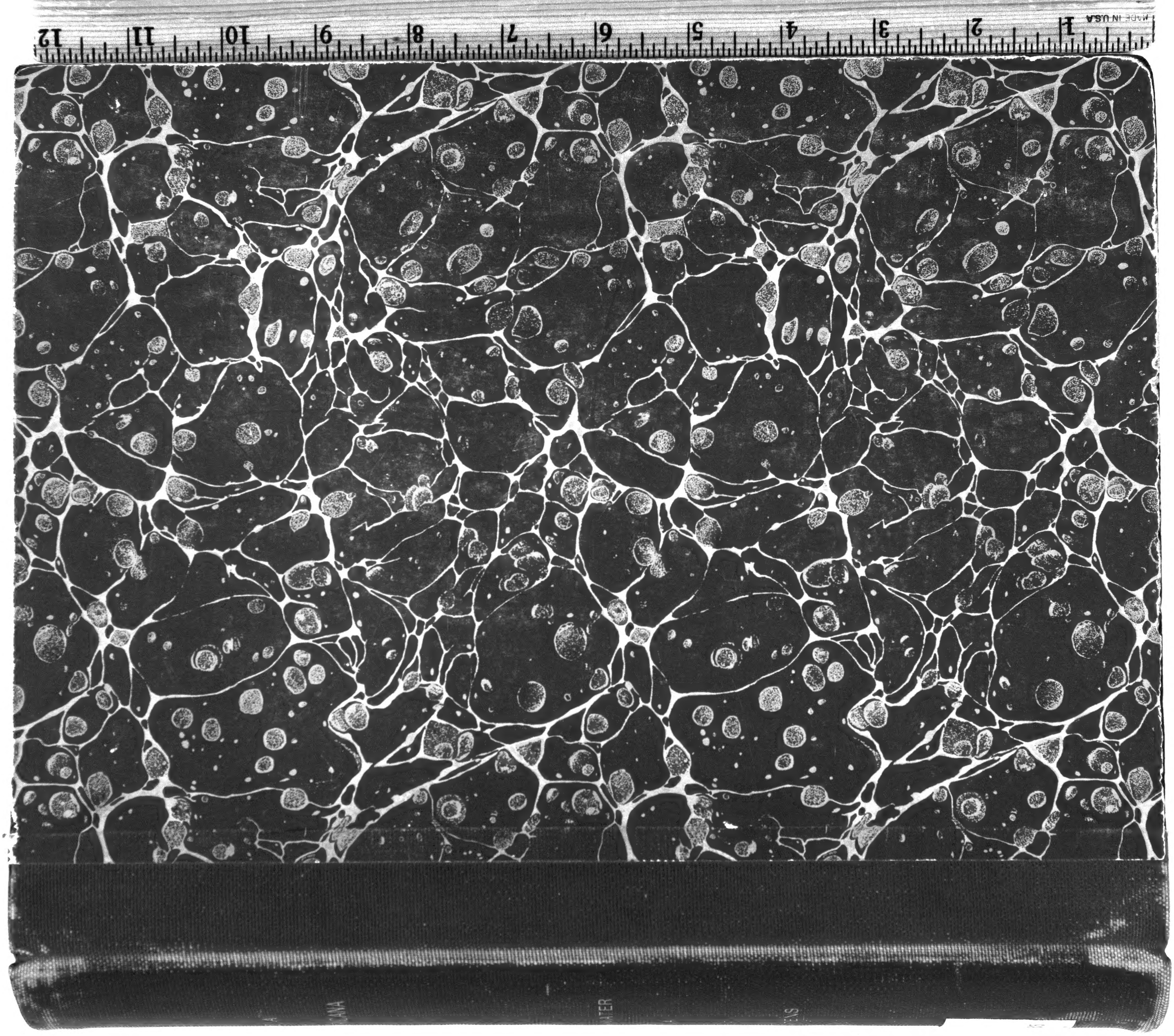

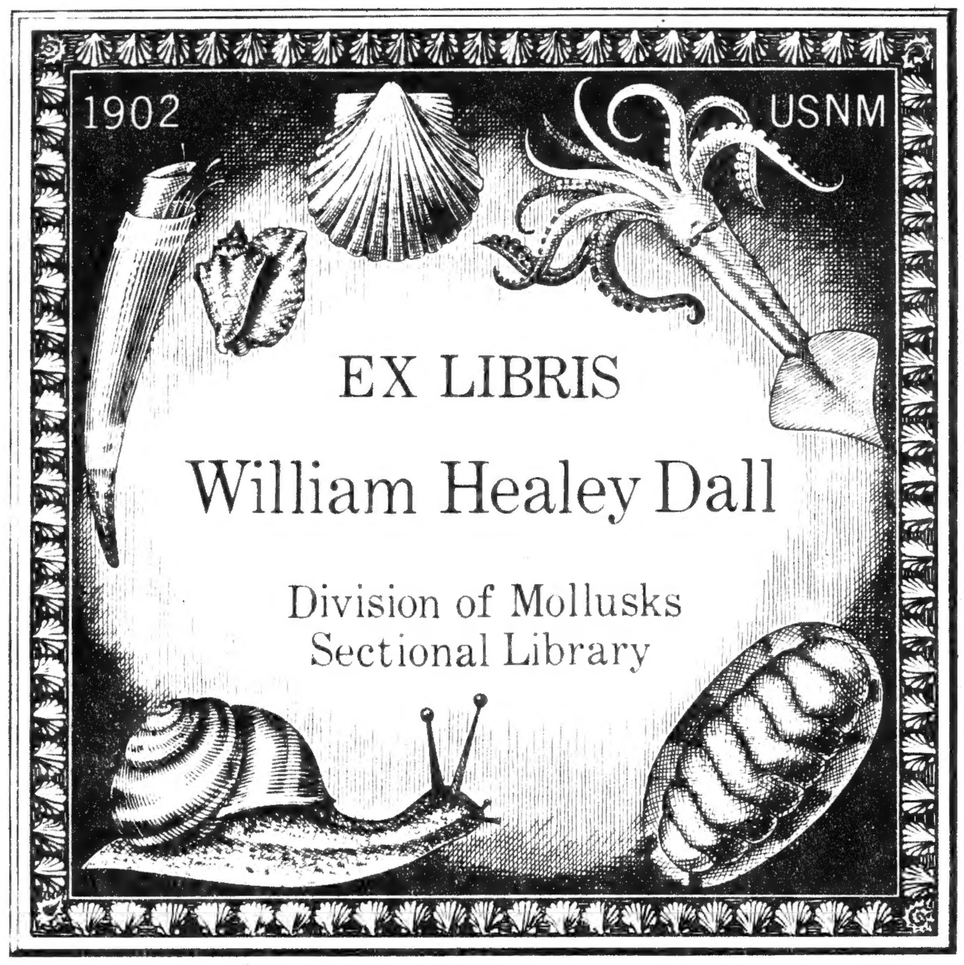
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BIOLOGIA CENTRALI-AMERICANA.

LAND AND FRESHWATER MOLLUSCA.

BY

PROF. EDUARD VON MARTENS,

FOREIGN MEMBER OF THE ZOOLOGICAL SOCIETY OF LONDON.

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INTRODUCTION.

More than ten years ago, chiefly at the invitation of my friend Dr. P. L. Sclater, I undertook the task of compiling the Volume on the Land and Freshwater Mollusca for the 'Biologia Centrali-Americana.' It is almost needless to say that the work has taken me much longer than I anticipated, notwithstanding the previous labours of P. Fischer and H. Crosse, H. Strebel, and myself on the Molluscan fauna of the same region. Many species obtained by our Editors, as well as others in the Berlin Museum, or sent to me by various friends and collectors, required further examination; and when this Volume was commenced the "Mollusques" of the 'Mission Scientifique en Mexique et dans l'Amérique Centrale,' and the 'Beitrag zur Kenntniss der Fauna mexikanischer Land- und Süsswasser-Conchylien,' were only in course of publication. Official occupation, too, at the Berlin Museum took up nearly all my time, so that I could bestow very little more than my leisure hours on this work; but I have had at my disposal the rich collection of shells and the valuable library belonging to the "Museum für Naturkunde."

The systematic arrangement of the Mexican and Central-American forms having been dealt with satisfactorily by the above-mentioned authors, my chief object has been to collate all the published papers, as well as various unpublished MS. notes, on the subject, in order to obtain a sound foundation for remarks on zoo-geographical distribution. For this purpose the known localities for each species have been grouped or arranged under different headings, chosen with regard to the political frontiers and the eastern and western slopes of the central portion of each country belonging to the region under investigation; the scheme adopted, it is true, has been slightly varied, or rather corrected, since the publication of the first portion of the work, but it will be, I think, easily understood in every case.

The general limits adopted for the whole fauna are the political frontier of Mexico in the north and of that of the State of Panama in the south, not on account of these being really natural, but because clearly-defined boundaries were needed. The Peninsula of California has been excluded by the Editors as not coming within the scope of their work, though its Molluscan fauna does not appear to be very different from that of N.W. Mexico; no new material from that region was, however, available for examination. The Tres Marias Islands, belonging politically to Mexico, are included, as well as Utila and Bonacca, in the Bay of Honduras. A few forms from Cocos Island, situated between Panama and the Galapagos Is., and belonging politically to Costa Rica, are noticed, chiefly for the purpose of figuring two of H. Pittier's novelties from that place, one of them being allied to a Nicaraguan form; its fauna, however, has, on the whole, a somewhat Polynesian character.

On the Plates, of which twenty-eight coloured and sixteen uncoloured have been required, I have endeavoured to figure not only the new species, but also those previously described that had not been satisfactorily illustrated before. The present Volume, with the above-mentioned works of Fischer and Crosse and Strebel, both indispensable to the student of the Mexican and Central-American Mollusca, will therefore include a figure of nearly all the known species of these regions. Moreover, I have in many cases given figures of the young state, or of individual variations, chosen from a large number of specimens obtained at the same locality, to show the various forms of the same species.

The historical development of our knowledge of the Mexican and Central-American Mollusca having been somewhat fully exposed by myself in the 'Malakozoologische Blätter,' xii. pp. 1–4 (1865), and, at greater length, by Fischer and Crosse in the "Mollusques" of the 'Mission Scientifique en Mexique et dans l'Amérique Centrale,' i. pp. 2–9, and ii. pp. 655, 656, I shall here confine myself to some remarks concerning the travellers whose collections have chiefly contributed to my own work on the subject.

MEXICO.

Ferdinand Deppe, a gardener of Berlin, accompanied, in 1824–25, Count von Sack in his voyage to Mexico. He lived chiefly at Vera Cruz, Jalapa, and the City of Mexico, and remained independently in the country until 1827. In the following year he went again to Mexico, with Dr. Chr. J. W. Schiede, for the purpose of collecting plants and other objects of natural history, returning to Berlin, after the

death of the latter, in 1837, by way of California and the Philippines. His memory has been preserved amongst botanists by the name *Deppea*, given to a genus of Rubiaceæ by Chamisso and Schlechtendal. A number of land, freshwater, and sea-shells collected by him are preserved in the Berlin Zoological Museum.

C. A. Uhde was Prussian Consular Agent at Matamoros, near the mouth of the Rio Grande del Norte, about 1830–45. His botanical and zoological collections, including some land and freshwater shells (among others, *Holospira imbricata*, which has not since been met with), and many marine ones, from both the east and west coasts of Mexico, were acquired in 1862 for the Berlin Museum. It was upon this material, together with the specimens obtained by Deppe, that my paper on the "Mexican Land and Freshwater Shells," in Pfeiffer's 'Malakozoologische Blätter,' vii. (1865), was based.

Professor F. Liebmann, friend of the well-known Danish Prof. Japetus Steenstrup, travelled in 1840 from Copenhagen to Vera Cruz and Papantla. He afterwards crossed the country to the Pacific coast, and returned to Europe in 1843, as I have been informed by Dr. E. Warming, of Copenhagen. Specimens of land and freshwater shells collected by him found their way into various private collections, as, for instance, those of Dr. L. Pfeiffer and Dr. R. A. Philippi, of Cassel, who described them in their works 'Monographia Heliceorum' and 'Abbildungen und Beschreibungen neuer Conchylien,' and also into that of Prof. Dunker, of Marburg, whose Mollusca have now been acquired for the Berlin Museum.

Carl Pieschel, Prussian Secretary of Legation, explored the Volcanoes of Mexico in 1853–54; and afterwards accompanied the Prussian Expedition to Eastern Asia, in 1859–62. He was honourably mentioned by A. v. Humboldt, in 'Kosmos,' iv. pp. 428, 566, &c., and is the author of an instructive paper on the Mexican volcanoes in the 'Zeitschrift für allgemeine Erdkunde,' vi. (1856). The Berlin Museum is indebted to him for an interesting species of *Otostomus*, found at Manzanillo, on the Pacific coast.

Dr. Karl Hermann Berendt, born at Danzig in 1817, left his country in 1851 on account of the political troubles of 1848. He lived for some time in Nicaragua (1853), the city of Mexico, Orizaba, and, finally (1855–62), in Vera Cruz, practising as a doctor. Here he met with the merchant Hermann Strebel, who was born in 1834 at Hamburg, and represented his father's firm in the city of Mexico in 1849–52, and

subsequently (1853) at Vera Cruz. The younger man thus became interested in scientific pursuits. The chief field of their common researches was, however, not the city of Vera Cruz, in the hot coast-region, but the sugar-plantation of "Mirador" (look-out) of Mr. SARTORIUS, near Huatusco (between Orizaba and Jalapa), in the temperate region (tierra templada). The first novelties among the Mexican land-shells sent to Europe by Dr. Berendt were described by Dr. Pfeiffer in his 'Malakozoologische Blätter' for 1861 and 1862, among which were *Cyclotus berendti*, *Helicina berendti*, *Helix berendti*, and others; also *Helix hermanni* (p. 128) was named after him. STREBEL was afterwards assisted in his conchological researches by the family SALAS, to the members of which he dedicated his genus *Salasiella*, as well as *S. joaquinæ* and *Glandina estefaniæ*; his own name is perpetuated in that of the genus *Strebelia*, Crosse. The unsettled state of affairs preceding the French-Mexican war rendered this scientific activity more difficult, but was the cause of the visit of the Prussian ship 'Gefion,' the doctor of which, Dr. CARL FRIEDEL, brought home some shells from Vera Cruz, these afterwards coming into my hands. Dr. Berendt finally departed from Vera Cruz in 1862 for the Provinces of Campeche and Tabasco, and devoted himself almost entirely to ethnological researches till he died in 1878, in the city of Guatemala (see his biography in the 'Proceedings of the American Antiquarian Society' for April 1879, and in the German Geographical Journal 'Globus,' lix. no. 22). Strebel left Vera Cruz in 1867, and returned to Hamburg, where he still resides as chief of a merchant house and promoter of scientific interests among his fellow citizens. He published there, in 1873–82, five quarto volumes entitled 'Beitrag zur Kenntniss der Fauna mexikanischer Land- und Süsswasser-Conchylien,' containing very accurate descriptions and excellent figures of about 263 species; the numerous anatomical notes in them were contributed by Dr. GEORG PFEFFER. The shells collected by Strebel were given by him to the "Hamburg Museum of Natural History," and I have had occasion to examine many of them while studying the Mollusca for the 'Biologia Centrali-Americana.'

H. HÖGE collected land-shells principally in the States of Chihuahua, Puebla, Vera Cruz, and Oaxaca, in 1879 and 1880; H. H. SMITH in Central, Eastern, and South-eastern Mexico, in 1887–1889; W. RICHARDSON in North-western Mexico, in 1889; and G. F. GAUMER in the Island of Bonacca, off the coast of Yucatan. The shells obtained by these four travellers were handed to me for examination by the Editors of this work, together with those found by F. D. Godman in Eastern Mexico and Yucatan in 1887–88.

During recent years additions to the Mexican land and freshwater shells have been contributed by several North-American travellers, see Pilsbry in the 'Proceedings of the Academy of Natural Sciences of Philadelphia,' 1891, p. 310, 1892, pp. 153, 338, and 1899, p. 391; and Dall, in the 'Proceedings of the United States National Museum,' xviii. (1895) p. 1, and xix. (1896) p. 333.

GUATEMALA.

The first collector of land and freshwater shells in Guatemala and the adjacent regions was ARTHUR MORELET, born at Dijon, France, in 1809, who travelled, mostly on foot, in 1847, in Yucatan, Tabasco, Vera Paz, and Guatemala, visiting the ancient ruins of Palenque and the Lake of Itzá (see A. Morelet, 'Voyage dans l'Amérique Centrale,' 1857, in two volumes, 8vo, and the obituary notice of him by H. Drouet, Dijon, 1893). He published two papers, containing descriptions of new species, under the title 'Testacea Novissima,' 1849 and 1851, including also Cuban forms. I am indebted to him for the opportunity of seeing and examining some of them, chiefly the smaller-sized critical species of *Streptostyla*, *Helix*, *Hyalinia*, and *Guppya*. After his death, on Oct. 9th, 1893, the whole collection passed into the possession of the British Museum, when E. Smith was kind enough to compare some of his freshwater types on behalf of this work.

OSBERT SALVIN, M.A., F.Z.S., collected land and freshwater shells in Guatemala in 1857, and again in 1861–62. A list of those found by him was given by Canon H. B. Tristram in the 'Proceedings of the Zoological Society of London' for 1861, pp. 229–233, 1863, pp. 411–413, seventy-nine species being enumerated altogether. In the second part of this paper it is stated that most of the species mentioned in the first list were found in the immediate neighbourhood of Dueñas, near Antigua (S.W. Guatemala), and that those enumerated in the second list were chiefly from the district of Vera Paz and the Lake of Peten (N. Guatemala). Subsequently, Salvin sent me a number of Guatemalan shells for determination, and I gave a (third) list of them in the 'Proceedings of the Zoological Society' for 1875, pp. 645–647, thirty-two species being noticed. Through his kindness I have also had the opportunity of examining many of the types of those described by Canon Tristram.

Dr. OTTO STOLL, of Zürich, Switzerland, travelled in Guatemala in the years 1878–83. He has written an interesting work entitled 'Guatemala, Reisen und Schilderungen'

(Leipzig, 1886), in which remarks on the land and freshwater Mollusca of various localities are to be found, pp. 47 (Lake of Amatitlan), 53 (City of Guatemala), 63 (Cerro Quemado), 198, 199 (district Cholhuitz), 461 (Izabal), and 472 (Livingston). The ninety-three shells he collected, kindly entrusted to me for determination, form an essential and important part of the material available for this work. Some of them I had previously described in 'Sitzungsberichte der Gesellschaft naturforschender Freunde zu Berlin,' 1886, p. 161, and 1887, p. 106. The drawings of the living animal made by him have been reproduced on our Plates; fortunately, we are enabled to represent nearly all the more important genera in this manner.

George C. Champion collected in Guatemala, in 1879–81, chiefly in Vera Paz, where also Conradt obtained a number of shells, some of these latter having been acquired by the Editors of the present work and others by the Berlin Museum.

HONDURAS.

The land-shells collected in Honduras by Dyson were described by Dr. Pfeiffer in the 'Proceedings of the Zoological Society of London' for 1846 and 1851, some of them subsequently finding their way into the more important German collections. Others obtained by the Swedish pharmacist Justus Hjalmarson, about 1858, were partly dealt with by Dunker in the same year, these being now in the Berlin Museum.

The Island of Utila has been malacologically explored by Mr. Charles T. Simpson: see Ancey, in the 'Annales de Malacologie,' i. p. 237 (1886).

NICARAGUA.

Various land-shells from Nicaragua, principally from the neighbourhood of Realejos, and found by H. Cuming in 1827, have been recorded, and specimens from this country are to be found in the principal collections. Several interesting Unionidæ from the Lake of Nicaragua were described in 1847 and 1848, in the 'Zeitschrift für Malakozoologie,' by R. A. Philippi, who received them from the French collector Largilliert (the original specimens seem to have been lost), and others, in 1868, by Isaac Lea, in the 'Proceedings of the Academy of Natural Sciences of Philadelphia,' these latter having been obtained from the botanist Bridges (see Lea, Observ. Gen. *Unio*, xii. p. 56). Dr. A. S. Œrsted obtained three species of land and five of freshwater shells in Nicaragua, which were described by Dr. Mörch in

the 'Malakozoologische Blätter,' vii. (1861); the types of these are in the Museum of Copenhagen, and I have been enabled to examine and figure one of them, thanks to the kindness of Prof. Rud. Bergh. A more complete list of Nicaraguan shells, including thirty-three terrestrial and eighteen freshwater species, with detailed observations on their occurrence and habits, from his own observation, has been given by Ralph Tate in the 'American Journal of Conchology,' v. pp. 151–162 (1869–70). Some others, collected by T. Belt, in November 1877 and December 1879, and by E. Janson, between 1870–80, were contained among the shells sent to me for examination by the Editors of this work.

COSTA RICA.

Very little was known about the land and freshwater shells of Costa Rica previous to the researches of the late W. N. Gabb, who enumerated forty-four species from that country in the 'Proceedings of the Zoological Society of London' for 1879. Three German naturalists had, however, thoroughly explored many portions of Costa Rica, between 1853–66, but they paid no particular attention to the Mollusca: Moritz Wagner, in 1853–54 (see 'Die Republik Costarica,' 1856); Dr. A. von Frantzius, in 1854–66 [see 'Zeitschrift der Gesellschaft für Erdkunde zu Berlin,' iii. p. 289 (1868), 'Archiv für Naturgeschichte,' xxxv. (1869), and 'Journal für Ornithologie,' xvii. (1869)]; and Carl von Seebach, Geologist, in 1864–65. To Moritz Wagner we are indebted for the very characteristic *Helix costaricensis*. The Berlin Museum received in 1856 a number of shells, including a few land and freshwater forms, collected by Dr. Carl Hoffmann, a companion of v. Frantzius, who died in 1859, in Punta Arenas; in later times a few others were bequeathed to that institution by v. Seebach; and still more recently various land-shells, obtained in the interior of Costa Rica by Julius Carmiol and van Patten, both residents at San José, in 1864 and 1868 [see 'Malakozoologische Blätter,' xv. (1868)], have been added. In 1861 Dr. Mörch published descriptions of one terrestrial, one freshwater, and eight submarine species, found by Dr. A. S. Œrsted on the Pacific coast of Costa Rica (see 'Malakozoologische Blätter,' vi. and vii.). In 1878 A. Boucard described seven new species of Costa Rican land-shells in the 'Proceedings of the Zoological Society of London' for that year.

Among the shells sent to me for examination by our Editors, in 1888, there were a few specimens collected by H. Rogers in Costa Rica.

During recent years, however, shortly after having commenced the publication of this work, I have from time to time received for determination specimens of Costa Rican land and freshwater shells from HENRY PITTIER and PIERRE BIOLLEY, both residents in San José. These men have paid remarkable care and attention to the Mollusca, even to the very minute forms, and they have succeeded in rendering the conchological fauna of this country one of the best known within Central America. H. Pittier, first employed at the observatory in San José, and subsequently appointed a member of the Physical and Geographical Institute of that republic, commenced to send me shells in 1890, and then nearly every year afterwards, until the unexpected suppression of that Institute in January 1899, due to change of government. P. Biolley, of Neufchâtel, Professor and at present Assistant Naturalist at the Museo Nacional of Costa Rica, since 1891 resident in that country, sent his shells to his old teacher P. Godet, Director of the Natural History Museum at Neufchâtel, from whom I had most of them for determination and comparison. He has written a small pamphlet entitled 'Moluscos terrestres y fluviatiles de la Meseta Central de Costa Rica' (San José, 1897), in which fifty-nine species are enumerated.

PANAMA.

Up to the present time nothing but a few stray notes on the land and freshwater Mollusca of the State of Panama have been published, the earliest being those relating to H. Cuming's collections, made in 1827 and the following years. The marine and submarine shells have, on the contrary, been thoroughly investigated by C. B. Adams [see 'Annals of the Lyceum of Natural History of New York,' v. (1852), and also Carpenter's work], who has given a special list of those collected by himself, with accurate particulars of the localities of each species. The submarine Mollusca, therefore, of the shores of the Bay of Panama are better known than those of any other place in Central America or Mexico, either on the Pacific or the Atlantic coast.

A few shells obtained in Veraguas by WARSCEWICZ, about 1856, are preserved in the Berlin Museum.

For the knowledge of some additional terrestrial forms I am indebted to G. C. CHAMPION, who collected in Chiriqui, in 1881–83.

Terrestrial Mollusca.

Geographical Distribution of the Species in Mexico and Central America.

	Mexico.				Guatemala (with Tabasco, Chiapas, and Yucatan).					Honduras and Salvador.		Nicaragua.			Costa Rica.			Panama.	
	N.W.	Centr.	S.W.	E.	Tabasco, Chiapas.	Yucatan.	N.	Centr. and E.	S.W.	W.	E.	W.	Centr. and E.	N.E.	W.	Centr.	E.	S.* (W.)	N. (E.)
Cyclotus (Neocyclotus)	..	..	1	1	1	1	1	1	2	..	1	..	1	..	2	1	3	..	2
Cyclophorus (Amphicyclophorus)	1	..	3	1	1	..	2	..	..	..	1	..	..	..	1				
—— (Cyrtotoma)	..	..	..	1	2														
Tomocyclus	..	..	..	..	2	..	3												
Choanopoma	..	..	1	..	1	..	2												
Chondropoma	..	..	..	1	3	1	6	1	..	..	5								
Diplommatina	..	..	..	..	..	..	..	..	1										
Helicina	..	4	2	14	5	3	5	9	3	..	9	..	1	5	..	2	5	1	1
Schasichila	..	1	..	2	..	..	1	..	1										
Proserpina	..	1	..	3															
Strebelia	..	..	..	1															
Glandina	5	6	13	24	4	2	8	2	4	..	2	2	1	1	..	3	7	1	1
Salasiella	..	..	1	1	1	..	..	..	1										
Streptostyla	..	1	2	21	10	3	11	4	2	..	3	..	1	..	1	7	6	..	1
Omphalina	..	..	3	9	2	..	2	..	..	..	..	..	..	..	..	1	1		
Hyalinia	..	..	2	3	..	..	2	2	1	..	..	..	1	..	2	6	4		
Guppya	..	1	..	2	1	..	3	1	2	..	1	1	1	..	2	4	3		
Pseudohyalina	..	..	..	3	2	..	..	1	1	..	..	..	1	..	..	2			
Patula et Microconus.	2	..	..	1	..	..	..	1	1	..	..	..	..	..	..	1			
Thysanophora	..	1	1	3	1	1	2	..	..	..	1								
Acanthinula	..	..	..	2	2	..	1	..	1	..	1	..	1	..	..	1			
Vallonia	..	..	..	..	..	..	..	1											
Trichodiscina	..	..	3	2	2	1	2	1	1	..	1	1	..	..	1	1	1		
Averellia	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	1		
Praticolella	1	1	..	3	1	..	1	..	..	..	..	1	1	..	1				
Arionta ?	2	..	..	1	1														
Pomatia	..	1																	
Lysinoë	..	1	1	..	1	..	2	1	2	1	1								
Oxychona (costaricensis)	..	..	1	2	..	..	1	1	1	..	1	..	..	..	1	1	2		
Solaropsis	..	..	..	..	..	..	1?	..	..	..	..	..	..	..	..	..	1		
Polygyra	8	5	6	7	4	1	..	..	..	..	1								
Strobila	..	..	..	1	..	..	1												
Labyrinthus	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	1	2	1
Ortalichus	3	2	6	2	1	4	3	2	1	1	..	1	4	..	3	..	1	..	2
Otostomus	6	12	7	12	5	4	10	5	6	1	1	..	5	..	6	11	6	4	
Bulimulus	1	2	2	3	..	..	..	..	..	..	2	1	1	1	1	1	1	2	
Rhabdotus	..	1	..	N.E.															
Globulinus	1																		
Peronæus	..	1																	
Leptomerus	..	..	1	2	3	1	2	1	2	..	2	1	1	1	1	1	1	2	
Simpulopsis	..	..	..	..	1	..	1												
Eucalodium	..	3	4	5	7	..	4												
Cœlocentrum	..	1	1	3	4	..	3	1	2										

* "S." corresponds to the W. (Pacific) slope and "N." to the E. (Atlantic) slope of Central America, as a whole.

Terrestrial Mollusca.—Geographical Distribution (*continued*).

	Mexico.				Guatemala (with Tabasco, Chiapas, and Yucatan).					Honduras and Salvador.		Nicaragua.			Costa Rica.			Panama.	
	N.W.	Centr.	S.W.	E.	Taba o, Chiapas.	Yucatan.	N.	Centr. and E.	S.W.	W.	E.	W.	Centr. and E.	N.E.	W.	Centr.	E.	S. (W.)	N. (E.)
Holospira	2	5	2	4	1	1													
Epirobia	..	..	..	2	2	..	4	1											
Cylindrella	..	..	..	..	..	..	..	..	..	..	1								
Macroceramus	..	1	..	1	..	1	1	..	..	..	2	..	..	..	..	1			
Opeas	..	3	2	5	3	1	5	..	3	..	1	..	..	..	2	2	4	..	2
Subulina	..	..	..	1	2	1	3	..	1	..	..	..	1	..	2	..	2	..	1
Pseudosubulina	..	..	2	2	3	..	2	1	2										
Spiraxis	..	..	1	11	..	..	2	..	1	..	..	..	..	..	2				
Tornaxis	..	..	..	..	..	..	..	1											
Leptinaria	..	..	..	2	1	..	3	1	2	..	4	..	1	1	7	6	8	..	1
Tornatellina	..	..	..	..	..	..	..	..	..	..	..	1							
Melaniella	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	
Cæcilianella	..	..	..	1															
Oryzosoma	..	..	..	..	..	1													
Pupa	2	2	1	2	..	1	..	2	..	..	..	1	..	..	..	..	..	..	1
Pupoides	1	1																	
Succinea	1	6	1	4	1	1	2	3	3	..	..	1	1	..	2	1	1	1	
Xanthonyx, Cryptostracon	..	..	..	2	1	..	..	..	..	..	..	..	..	..	..	1			
Ariolimax	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..			
Philomycus	..	..	..	2	..	..	..	..	..	..	..	..	..	1	..	1			
Limacidæ	..	..	..	2	..	..	2	1	1	..	..	..	..	1	..	..	1		
Veronicella	..	..	1	1	1	1	..	..	2	..	..	..	..	2					
Carychium	..	..	..	1	..	..	..	..	1	..	..	..	..	..	..	1			

The chief zoo-geographical interest in the land and freshwater Mollusca of the region under investigation lies in the intermingling of the North and South-American forms within its limits (rather than in the endemic species), and the relationship of the fauna to that of the West-Indian Islands, and also of that of the two slopes, the Atlantic and the Pacific, the one to the other.

The most characteristic genera of land-shells inhabiting Mexico and Central America, or those including the greatest number of species, are *Helicina*, *Glandina*, *Streptostyla*, *Polygyra*, *Ortalichus*, *Otostomus*, *Eucalodium* (with the nearly allied *Cœlocentrum*), and *Holospira* (including *Epirobia*). Each of these has a somewhat different distribution.

Helicina is very rich in species in the West Indies, moderately so in South America,

where it extends, however, to the southernmost part of Brazil; a few forms occur in North America, the genus reaching to Georgia and Tennessee.

GLANDINA has its headquarters in Mexico and Central America, extending not quite so far southward, and a little further northward, than *Helicina*; it is represented in the West-Indian Islands by the somewhat different groups of *Varicella* and *Oleacina*, s. str.

STREPTOSTYLA is almost peculiar to Southern Mexico and Central America, having one species only, so far as at present known, in the more northern parts of Mexico, viz. *S. novoleonis*, very few in the northern parts of South America, and some not very characteristic forms in the West-Indian Islands.

POLYGYRA is North American as well as Mexican, and does not extend southward beyond Honduras. In the West Indies it seems to be confined to the larger islands of Cuba and Jamaica (*P. paludosa*). In North America most of the species are restricted to the Southern United States, a few extending to the Cumberland subregion (Tennessee and Kentucky), one, *P. leporina*, to Illinois and Indiana.

ORTALICHUS is almost equally well represented in Mexico and Central America, the West Indies, and the northern part of South America, extending southward to about as far as the Amazon valley *. It is wanting in North America, except in the southern part of Florida, which belongs more properly to the West-Indian region.

OTOSTOMUS (= *Goniognathmus*, Crosse, nec *Bulimulus* = *Orthotomium*) is mainly South American, extending to Southern Brazil and the Argentine Republic (*O. papyraceus*); but it is also well represented in Central America and Mexico, becoming less numerous in species in the West-Indian Islands, and wanting altogether in the United States.

EUCALODIUM and CŒLOCENTRUM are peculiar to Central America or the southern parts of Mexico, but they do not extend south of Guatemala, and are therefore absent from the South-American continent.

HOLOSPIRA, with *Epirobia*, is also almost peculiar to Mexico and the northern half of Central America: *Holospira*, s. str., extends as far north as Texas and

* The Berlin Museum has received specimens of *O. phlogerus*, d'Orb., from Dr. von Steinen, from the upper affluents of the Rio Xingu, where they are used by the Bakairi Indians as ornaments; and also some of *O. pulchellus*, Spix, from the collector Rohde, from the banks of the Rio Mondego, in Matto Grosso.

Arizona, but is wanting in Guatemala; *Epirobia* inhabits the southern part of Eastern Mexico (State of Vera Cruz), extending southward to Eastern Guatemala *.

Amongst the genera common to Central and South America and the West-Indian Islands, and absent from North America (with the exception of *Chondropoma*, which occurs in Florida), are *Cyclotus* (*Neocyclotus*), *Cyclophorus* (*Amphicyclotus*), *Chondropoma*, and *Cistula*. *Labyrinthus* is peculiar to the southern part of Central America (from Nicaragua southward) and the northern half of South America. The species enumerated under the subgeneric names *Praticolella*, *Lysinoë*, and *Oxychona* are characteristic of several parts of Mexico, Guatemala, and Costa Rica; but their natural affinities have not yet been made out sufficiently well to show whether they bear any relationship to the fauna of Western North America or to that of the Andes of the southern continent. *Opeas* is circumtropical, and *Succinea* has a world-wide distribution.

As regards the smaller forms, and those which are without external shell, it must be borne in mind that their distribution in Mexico and Central America, so far as at present known, shows the results of collecting in particular localities rather than true zoo-geographical data. The most fully explored district is, without doubt, the State of Vera Cruz (E. Mexico, of our Tables); then follows Guatemala, Costa Rica, Chiapas and Tabasco, Central Mexico and Mazatlan (N.W. Mexico), and the region bordering the United States frontier; the least-known districts are Salvador and the State of Panama.

The more characteristic genera and subgenera of the land-shells may be grouped together to show their geographical relationship in the following manner:—

A. *Essentially Mexican and Central-American.*

a. Not extending to the greater part of North nor to South America.

aa. Not represented in the West-Indian Islands.

Tomocyclus, southward to Honduras; *Streptostyla*; *Trichodiscina*, southward to Costa Rica; *Praticolella*, from Arkansas and Texas to Costa Rica; the group of *Helix costaricensis*

* It has been recorded from Venezuela, but this statement requires confirmation.

(subgen. *Oxychona,* infrà); *Eucalodium* and *Cœlocentrum,* southward to Guatemala; *Holospira,* from Arizona and Texas to South-west Mexico and Yucatan; *Pseudosubulina*; *Xanthonyx,* from Misantla to Chiapas.

bb. Represented in the West-Indian Islands.

Macroceramus (Guatemala).

b. Extending into the greater part of North and South America.

Glandina, Lysinoë (as restricted in this work): both absent from the West-Indian Islands.

B. *Essentially West-Indian.*

Choanopoma, with *Adamsiella,* scarcely extending to South America, absent from North America; *Chondropoma,* with *Cistula,* extending to South America, absent from North America; *Helicina,* extending a little north of the Mexican frontier and still further in South America; *Spiraxis.*

C. *Prevailing North-American.*

a. Scarcely represented in the West-Indian Islands.

Omphalina, southward to Guatemala; *Polygyra,* southward to Honduras; *Pupa,* with *Vertigo* and *Leucochilus,* southward to Nicaragua and (subgen. *Leucochilus*) to Panama (somewhat cosmopolitan); *Pupoides,* southward no farther than Central Mexico.

b. Not represented in the West-Indian Islands.

Strobila, southward to North Guatemala; *Rhabdotus* (group of *Bulimulus dealbatus*), southward to the Isthmus of Tehuantepec.

D. *Prevailing South-American.*

a. Represented in the West-Indian Islands.

Cyclotus (*Neocyclotus*); *Cyclophorus* (*Amphicyclotus*); *Ortalichus*; *Otostomus*; *Bulimulus,* subgen. *Leptomerus*; *Simpulopsis*; *Leptinaria.*

b. Essentially South-American, and not represented in the West-Indian Islands.

Labyrinthus, to as far north as Costa Rica; *Solaropsis,* to as far north as N. Guatemala.

Freshwater Mollusca.

Geographical Distribution of the Species in Mexico and Central America.

	Mexico.			Guatemala (with Tabasco, Chiapas, Yucatan, and British Honduras).				Honduras and Salvador.		Nicaragua.			Costa Rica.		Panama.	
	W.	Centr.	E.	N.	Yucatan, Belize.	S.W. (W.)	E.	W.	E.	W.	Centr. and E.	N.E.	W.	E.	S. (W.)	N. (E.)
Physa.																
a. Aplecta	1	..	2	4	2	2	3	..	..	..	..	..	3			
b. Stenophysa	2	..	2	1	3	1	1	..	1	..	1	..	1	..	1	
c. Alampetis	2	1	3	2	..	..	1	..	1	..	1	..	1			
Limnæa	1	1	1	..	..	1	..	..	..	..	..	..	1	..	..	1
Planorbis.																
a. Helisoma	1	1	2	2	1	1	1	..	..	..	1	..	1	1		
b. Menetus	..	1	1	2	2	..	..	..	..	..	1					
c. Gyraulus	3	..	..	2	2	1	1	..	1	..	1	..	1	..	2	
d. Spiralina	..	..	1	..	..	1	..	..	..	..	1					
e. Taphius	..	..	..	2	..	..	..	..	..	..	1					
f. Hippeutis	..	..	..	1	..	..	1									
g. Planorbula	1	..	1	1	2	1	..	..	..	..	..	..	..	..	1	
Ancylus	1	..	1	1	1	..	..	..	..	..	..	1	1			
Gundlachia	..	..	..	..	..	..	..	..	1							
Ampullaria	5	..	2	5	4	2	2	..	3	..	2	..	2	..	1	3
subgen. Ceratodes	..	..	..	..	..	..	..	..	..	..	..	..	1?			
Vivipara	..	..	1?													
Valvata	..	1														
Cochliopa	..	..	..	1?	..	1	..	..	..	1	..	..	2			
Amnicola	..	4	2	1	1	3	..	3	..	1	..	1	3	2	1	
Tryonia	..	..	..	1												
Pachychilus.																
a. Glyptomelania	..	1	..	3	..	1	3	1	1	..	3	1	1?			
b. Pachychilus, s. str.	1	..	4	8	..	1	2	1	1	..	1	..	1?			
c. Oxymelania	..	2?	1	1												
d. Potamanax	..	..	..	2												
Semisinus	..	..	..	1	..	..	1	..	..	..	..	..	..	1		
Neritina.																
a. Alina	..	..	1	..	..	1	..	..	..	1	..	..	2	..	1	
b. Neritæa	1	..	1	1	1	..	1	..	..	..	1					
Unio.																
a. Crenodonta	..	..	1 (2?)	2												
b. Psoronaias	..	..	1	6												
c. Arotonaias	..	..	..	..	..	..	..	..	1	..	7	..	..	..	1	
d. Pleurobema	..	..	1	2												
e. Sphenonaias	1	..	2?	..	..	1	1	1								
f. Nephronaias	1	1	2	1												
g. Simonaias	..	..	..	1	..	1	1	..	2 (3?)	..	2?					
h. Lampsilis	..	..	7	1												
i. Elliptio	..	..	3 (5?)	3	..	2	1	..	..	..	1	..	..	..	..	1
k. Uniomerus	..	1	..	1												
l. Metaptera	..	..	..	2	2											
Anodonta.																
a. Anodonta, s. str.	3	1	3	1	1											
c. Patularia	1	..	1	3												

Freshwater Mollusca.—Geographical Distribution (*continued*).

	Mexico.			Guatemala (with Tabasco, Chiapas, Yucatan, and British Honduras).				Honduras and Salvador.		Nicaragua.			Costa Rica.		Panama.	
	W.	Centr.	E.	N.	Yucatan, Belize.	S.W. (W.)	E.	W.	E.	W.	Centr. and E.	N.E.	W.	E.	S. (W.)	N. (E.)
Anodonta (*cont.*).																
d. Scolianodon	..	..	..	..	..	..	..	..	..	..	1					
e. Euryanodon	..	..	2	1												
f. Glabaris	..	..	..	..	..	..	..	..	..	..	2					
g. Pseudoleila	1															
h. Pachyanodon	1	..	..	..	..	1	..	..	..	..	..	1	..	..	1?	
Mycetopus	..	..	..	..	..	1	..	..	..	..	..	1				
Polymesoda.																
a. Polymesoda, s. str.	2	..	1 (2?)	..	2	..	..	..	1	2	1	..	..	..	1	
b. Egeta	1	..	..	..	..	..	..	..	..	..	..	..	1?	..	1?	
Neocorbicula	1															
Sphærium	1	2	1 (2?)	1	..	..	..	..	..	..	..	..	1			
Eupera	..	..	..	..	1	..	..	..	..	..	..	..	1	..	1	
Pisidium	1	1	..	..	..	..	..	..	1	..	..	..	1			

Freshwater Shells characteristic of Mexico and Central America.

Physa, subgen. *Aplecta*, the species of larger size, ranging from Mexico to Peru.

Cochliopa, from California to Costa Rica.

Pachychilus, with its four subgenera: *Glyptomelania* and *Pachychilus*, s. str., ranging from Mexico to the northern part of South America, but absent from the West-Indian Islands; *Oxymelania* and *Potamanax*, not reaching southward beyond N. Guatemala, but represented also in Cuba.

Unio, subgen. *Psoronaias*, inhabiting South-eastern Mexico and Northern Guatemala.

The subgenera *Arotonaias* of *Unio* and *Scolianodon* of *Anodonta* are almost exclusively confined to the Lakes of Nicaragua and Managua.

Freshwater Shells showing a Nearctic Affinity.

The majority of the Limnæidæ, chiefly the subgenus *Alampetis* of *Physa*, the subgenera *Helisoma*, *Gyraulus*, and *Planorbula* of *Planorbis*, and the species of *Limnæa*. All these are, so far as at present known, more abundant in Mexico and Guatemala than in Nicaragua or Costa Rica; *Gyraulus*, *Planorbula*, and *Limnæa* extend, however, to the State of Panama.

The somewhat doubtful *Vivipara* and the only *Valvata*, but limited to Mexico.

Tryonia, of the Lake of Peten, the other species of this genus being Californian.

Unio, generally, as distinct from the South-American *Diplodon* (in the sense of v. Ihering and Simpson), more especially the subdivisions *Crenodonta*, *Lampsilis*, *Elliptio*, and *Metaptera*. The genus is much better represented in Mexico and Guatemala than in the more southern countries; of the subdivisions mentioned, *Elliptio* only is represented in Nicaragua and in Panama, and by a single species, no *Unio* being known from Costa Rica.

Anodonta, in the more restricted sense, and *Patularia*, both reaching no farther south than N. Guatemala and Yucatan.

It is very remarkable, however, that the family Strepomatidæ (Pleuroceridæ), so widely distributed in North America, from Lake Winnipeg and Montreal to Florida and Texas, and occurring also in California, has no known representative within our limits, not even in the northern parts of Mexico, *Pachychilus schiedeanus* having been proved by Troschel's examination of the radula to be a *Pachychilus* and not a *Goniobasis*.

Freshwater Shells showing a South-American and Antillean Affinity.

The subgenera *Menetus* and *Spiralina* of *Planorbis*, and the subgenus *Stenophysa* of *Physa*, each of which is well represented in the West-Indian Islands and on the continent of South America, all three ranging from Mexico to Nicaragua, the last even to Panama.

Ampullaria, including the subgenus *Ceratodes*. *Ampullaria*, s. str., is represented in the Southern States of North America (Georgia and Florida) by one species only. Within our limits it seems to be absent from the elevated tableland of Central Mexico, ranging from the southern parts of Mexico to Panama. In Guatemala and Honduras the species are numerous and very little inferior in size to those of the continent of South America, whereas the genus is somewhat poorly represented in the West-Indian Islands. *Ceratodes* belongs essentially to the South-American continent, exceeding its limits only in the adjacent islands of Tobago and Trinidad, and in Costa Rica, if the latter record is reliable (*cf.* p. 425).

Semisinus, a Caribbean and South-American genus, extending within our limits from N. Guatemala to Costa Rica.

Neritina, subgenus *Neritæa*, including also Caribbean and South-American forms,

extends from Mexico to Nicaragua, but is absent from the elevated tableland of Central Mexico *.

Glabaris (as understood by Simpson), or the *Anodontæ* with deep triangular sinulus (p. 525), a genus extending within our limits from S.E. Mexico to Panama.

Mycetopus, a genus extending as far north as S. Guatemala.

Eupera, a genus extending as far north as Yucatan.

There are scarcely any Mexican or Central-American species more nearly allied to the West-Indian forms than to those of South America, probably because in all islands, unless they are of very large extent (such as Madagascar, Borneo, and Australia), the freshwater fauna is generally poor. We may mention the great resemblance of *Unio yzabalensis*, of Eastern Guatemala and Honduras, to the Cuban *U. scamnatus*. *Amnicola coronata* is widely spread in the West-Indian Islands, and also in Central America from Vera Cruz to Nicaragua, but on the continent of South America it is confined to Colombia and Venezuela. *Menetus*, *Spiralina*, and *Stenophysa* are equally characteristic of the freshwater fauna of the West-Indian Islands, and *Gundlachia* also inhabits Cuba, California, and the Potomac.

From the above analysis it is clear that the Terrestrial and Freshwater Mollusca of Mexico and Central America, as a whole, are not altogether peculiar, neither can they be termed North-American nor South-American; and as regards their relationship with the West-Indian fauna, no definite conclusion can be arrived at. But if one or two genera only are taken into consideration, it would be easy to suggest an affinity with the fauna of any of these main regions.

On referring to a map, we find that the long stretch of country included within the scope of this work is narrowed in several places, so as to form four large tracts of land, as well as a small additional piece:—

1. Mexico generally, to the Isthmus of Tehuantepec, broadly connected with the United States from the head of the Gulf of California to the mouth of the Rio Grande del Norte. Here, of course, the resemblance to the North-American fauna is the greatest, the species obtained in the districts explored by the "Boundary Commission"—Sonora, Arizona, Chihuahua, and New Mexico—being almost identical;

* On pages 472, &c., I have placed the locality Sayula under the head of Central Mexico, but it would perhaps be more correctly assigned to S.W. Mexico.

and the same remark applies to the Mollusca of the States of Coahuila, Nuevo Leon, and Tamaulipas, as compared with those of Texas. *Streptostyla novoleonis* is the first species to appear of the bright tropical fauna of Central America, and at Mazatlan an *Ortalichus* is a conspicuous land-snail. On the elevated tableland of Central Mexico the somewhat northern *Polygyra*, *Holospira*, and *Helix humboldtiana* are associated with the subtropical *Glandina* and the more tropical *Otostomus* and *Eucalodium*; and in the State of Vera Cruz, not only in its hot lowlands, but also in the temperate hill-region of Jalapa, Mirador, Cordova, and Orizaba, the Molluscan fauna approaches still nearer to that of Central America*. Among the freshwater shells, *Alampetis*, *Oxymelania*, and *Potamanax* may be named as rather characteristic. *Vivipara* and *Valvata* are North-American forms not reaching farther south than Mexico. Among the Bivalves, *Anodontæ* of South-American affinity (*Euryanodon* and *Pachyanodon*) make their first appearance in the southern part of Mexico, both east and west.

2. Guatemala, with Tabasco and Chiapas (S.E. Mexico in our Tables), Yucatan, and Belize (British Honduras), from the Isthmus of Tehuantepec to the constriction between Istapa and the Golfo Dulce. This tract of land possesses the most typical Central-American forms: several Cyclophoridæ and Cyclostomidæ, *Tomocyclus*, *Helicina*, and *Glandina* in moderate numbers, many *Streptostylæ*, and a few *Omphalinæ*; *Trichodiscina* and *Praticolella* are still present, *Lysinoë* is comparatively rich, and the group of *Helix costaricensis* is already represented by *H. trigonostoma* with its many varieties; *Polygyra* inhabits the lower districts of the Usumacinta, and *Holospira* is to be found in Yucatan; *Ortalichus*, well-developed *Otostomus*, *Eucalodium*, and *Cælocentrum* are richer here than elsewhere; *Epirobia*, *Macroceramus*, *Pseudosubulina*, and *Leptinaria*, each with several species; and *Simpulopsis* takes the place of the exclusively Mexican *Xanthonyx*. The characteristic Mexican forms are still visible, as are also most of the prevailing West-Indian and South-American ones. Among the freshwater shells numerous species of *Unio* of North-American affinities are present, but the large-sized *Ampullariæ* and *Pachychili* give a tropical character to the whole.

3. Honduras, Salvador, Nicaragua, and Mosquito Coast, from the re-entering

* Fischer and Crosse (Miss. Sci. Mex., Moll. ii. p. 673) were therefore justified in uniting the whole Atlantic slope of Mexico, from Tamaulipas in the north, with Yucatan, British Honduras, and Guatemala, into one geographical subregion.

angle of the Gulf of Honduras with the Golfo Dulce to the depression of the Lake of Nicaragua. Here a comparative impoverishment of the fauna commences: *Eucalodium*, *Cœlocentrum*, and *Omphalina* are absent; *Polygyra* is represented by one species only; and the Cyclophoridæ, *Glandina*, *Streptostyla*, and *Ortalichus* diminish in number. Among the freshwater shells, the species of *Unio* are fewer in number and of smaller size; the true *Anodontæ* of northern affinity have disappeared; and the subgenus *Arotonaias* is nearly, and *Scolianodon* quite, peculiar to the basin of the Lake of Nicaragua.

4. Costa Rica, with Chiriqui and Veraguas, from the depression of Nicaragua to the Isthmus of Panama. The general features are about the same as in no. 3, but the number of known species is greater, for which we are indebted to the recent exertions of H. Pittier and P. Biolley; but the increase consists chiefly in small-sized representatives of more widely-distributed genera. The impoverishment of conspicuous and characteristic forms still continues: the Cyclostomidæ and *Tomocyclus* are apparently absent, and *Polygyra* also; *Helix ghiesbreghti* is replaced by the group of *H. costaricensis*, including three species; the Cyclophoridæ, *Glandina*, *Streptostyla*, *Trichodiscina*, *Ortalichus*, and *Bulimulus* are well-represented; and new strictly South-American forms, like *Labyrinthus* and *Solaropsis*, make their appearance. *Trichodiscina* and the group of *Helix costaricensis* are the only subgenera which are not to be found in any part of South America. The total absence of Unionidæ in Costa Rica, if real and not simply due to imperfect research, may be attributed to the absence of large slowly-flowing rivers and great lakes.

5. The small portion of the State of Panama east of the Isthmus. This region seems to have a fauna like that of the northern part of the South-American continent. I should have preferred the Isthmus as a limit in my Tables and for the whole work, but I have been constrained to adopt the political boundary of the State of Panama (which includes also the Isthmus of Darien), because authors give for many species simply "Panama" as locality. These species can be enumerated safely as found within the State of Panama, but I have no means of knowing whether east or west of the deepest notch of the Isthmus.

The facts stated show that neither the Isthmus of Tehuantepec nor that of Panama affords a satisfactory boundary-line between the North- and South-American fauna;

the general resemblance of the land-shells of the Mexican State of Vera Cruz to those of Northern Guatemala forbid the former, the strictly South-American forms in Costa Rica the latter. The longer tracts of the Nicaraguan depression, or even that of the Golfo Dulce (as regards *Eucalodium*), will serve the purpose perhaps a little better, if we want a separating-line between the South-American and the Mexico-Guatemalan fauna. As a matter of fact, however, there is no definite limit between these zoo-geographical regions, no more than there are between the North- and South-European, and the Palæarctic and Oriental or Indian region. The main divisions used in zoo-geography, radiating from one centre and extending their dominion until they meet another, with which it would intermingle only in a comparatively narrow border-zone, do not really exist; but each of them, the Nearctic as well as the Neotropical, or any other, includes an abstract compound of families and genera of very different geographical extension, all having their peculiar conditions of life, and therefore also succeeding more or less in the common endeavour of extending their habitat. For instance, a considerable part of the Nearctic fauna is formed of families, genera, and even species which live also in Northern Europe and Northern Asia: it is the *circumboreal* fauna, crossing the Northern Atlantic and the Northern Pacific, and prevailing not only in the desolate Arctic regions, but also in the forest- and lake-countries of British North America and a portion of the United States (e. g., *Rangifer*, *Alce*, and a Bison, the Mustelidæ and Arvicolidæ, the Tetraonidæ, *Limnæa stagnalis*, *Margaritana*, &c.). But another essential part of the Nearctic fauna is formed of exclusively American families or genera, such as *Didelphys*, *Procyon*, the Sylvicolidæ, and the Strepomatidæ. Likewise within the Palæarctic division we find, not only in its southern provinces, but even in Scandinavia and European Russia, families and genera which bear witness of a fauna limited to Europe and Africa, e. g. *Erinaceus* and the Myoxidæ. In the same manner, within the limits of Mexico and Central America the various faunas are intermingled over the greater part of the region: the Nearctic represented by *Strobila* and *Polygyra*; that of New Mexico and Texas by *Holospira* and *Praticolella*; that of California and Peru by some Bulimulidæ; the Caribbean by *Choanopoma*, *Chondropoma*, and *Ortalichus*; that of the South-American continent by *Glabaris*; and the Mexican and Central-American by *Glandina*, *Streptostyla*, and *Eucalodium*.

As regards the elevation of the localities above the sea, I have noted what was available under each species in the body of the work; for special particulars concerning

numerous Costa-Rican forms I am indebted to H. Pittier and P. Biolley. But I dare not draw general conclusions, which might be disproved by the next observing traveller. The central Tableland of Mexico, without manifest drainage either to the Atlantic or to the Pacific, is treated in the enumeration of localities in the body of the work, and in the preceding Tables, as a distinct division. This region appears to be essentially poorer in Molluscs than the adjacent Eastern slope, the State of Vera Cruz, especially in Cyclophoridæ and Cyclostomidæ, as well as in *Omphalina*, among the land-shells; *Aplecta*, *Stenophysa*, *Ampullaria*, *Neritina*, *Glabaris*, and *Polymesoda*, among the freshwater shells, are wanting in Central Mexico, while they are present on the Western and Eastern slopes: the number of freshwater shells is also remarkably smaller, especially in the genera *Unio* and *Anodonta*; *Planorbis*, on the contrary, and the subgenus *Alampetis* of *Physa* are, however, well represented: among the land-shells, *Helicina*, *Glandina*, *Polygyra*, *Otostomus*, *Eucalodium*, *Holospira*, and *Succinea* are comparatively numerous. In Guatemala, Nicaragua, and Costa Rica I have also distinguished for the land-shells a central region, as distinct from the Pacific and Atlantic slopes: in Guatemala it comprises the metamorphic formations of the upper districts drained by the River Usumacinta and the upper half of that of the Rio Grande or Motagua River; in Nicaragua it corresponds to the basin of the Lake of that name, draining to the Atlantic, although nearer geographically to the Pacific; and in Costa Rica it comprises the elevated regions in the vicinity of the capital, San José, 1200 metres and more above the sea. The relationship of the fauna of these central parts to that of the neighbouring Pacific and Atlantic provinces will be seen particularized in the Tables: generally, it may be mentioned that *Helicina*, *Glandina*, *Streptostyla*, *Otostomus*, and *Succinea* are more or less well represented on the central plateaux, as in Central Mexico, and the Cyclophoridæ and Cyclostomatidæ very scarce. The species hitherto known to occur in the highest regions (2400–3500 metres, or about 8000–11,600 feet) on the central Tableland of Mexico and Guatemala belong to the genera *Helicina* (see *infrà*, pp. 33, 37, 603), *Glandina* (pp. 54, 73), and *Otostomus* (pp. 208, 210)*.

* Fischer and Crosse (Miss. Sci. Mex., Moll. ii. p. 677) mention correctly in this respect *Helicina* and *Glandina*; but they go too far in stating that in South America, as a difference from the fauna of Mexico and Guatemala, the land-shells of the most elevated regions are *Bulimulus*; for *Otostomus sulcosus* (*Bulimulus*, in the sense of Fischer and Crosse) reaches in Mexico the height of 3200 metres (see *infrà*, p. 208), and *O. ghiesbreghti*, in Guatemala, reaches 2600–2900 metres, which is a much greater elevation than that known for *Glandina* (2250–2400 metres), but less than that reached by *Helicina* (3500–3900 metres).

The Table given of the distribution of the Terrestrial Mollusca shows, further, a much larger number of species in North Guatemala than in what I have termed Central Guatemala; this difference is not due to the extent of the district or its lower elevation, or to the greater number of collectors, but chiefly to the geological formation of the soil. I limited "Central Guatemala" to the Province of Baja Vera Paz, occupied chiefly by metamorphic rocks, including also the drainage of the upper part of the River Usumacinta (Rio Salinas) to the north, and that of the Rio Grande to the east; the Province of Alta Vera Paz, which is mostly limestone, is here included in North Guatemala. Now in all parts of the world a limestone-formation is much richer in land-shells than a plutonic or volcanic one, not only with respect to the number of species, but still more as regards the number of individuals. In countries which have not yet been thoroughly explored the number of the individuals influences also the number of known species, as those which are most abundant are, of course, the first to be noticed by the passing traveller. The greater richness of this formation in land-shells is, however, not exclusively due to the chemical composition of the soil, but in large degree also to its physical qualities: limestone offers generally a very diversified aspect, with rocks and holes, and projecting edges and re-entering corners, more or less open to the sun's rays and yet offering everywhere shady places for retirement during the heat of the day.

Concerning Guatemala, Mr. Champion has sent me the following note:—"If you travel from the limestone regions of Vera Paz (Coban, Senahu, Cubilguitz, &c.) to the volcanic districts of the central tableland of Guatemala, you find a vast difference in the land-shells—many species and individuals in the former, scarcely any in the latter. The absence of the limestone, in my opinion, explains the absence of many forms, quite apart from the geographical situation." Dr. Stoll, in his work on Guatemala (1886), pp. 196–199, says, concerning the land-shells of the Pacific slope as compared with those of Alta Vera Paz:—"The district of Cholhuitz, 2000-4000 feet (640–1280 m.), on the advanced slopes of the Volcan de Santa Maria, which has deeply-cut ravines (barrancas) and virgin forest, with copious rainfall and a warm climate, offers a very rich Molluscan fauna, which, however, is rapidly decreasing by the annual cutting and burning of the trees; this fauna shows a very remarkable conformity with that of Alta Vera Paz, from which it is separated by large, barren, elevated tracts of land. In both districts live *Helix ghiesbreghti*, *H. eximia*, and *H. trigonostoma*, *Otostomus delattrei* (on the Pacific slope represented by the

var. *hiabundus*), and *Glandina sowerbyana* *. *Eucalodium*, on the contrary, is wanting on the Pacific slope of Guatemala."

It must be borne in mind, however, that in Costa Rica the environs of San José have been more thoroughly explored by various collectors than the more remote lower districts; this will account for the comparatively large number of species of *Streptostyla*, *Hyalinia*, *Guppya*, and *Leptinaria* on the central tableland. But it is the more remarkable that none of the large-sized freshwater shells, which cannot be easily overlooked, as *Ampullaria*, *Pachychilus*, *Unio*, and *Anodonta*, have hitherto been found there.

The differences between the fauna of the Pacific and Atlantic slopes, in both Mexico and Central America, are noticed in the Tables: they seem to be not very important as regards the land-shells. We find in many instances a very unequal number of species, but it must be remembered that in Mexico, Guatemala, Honduras †, and Nicaragua the Eastern slope is not only broader and provided with larger rivers, but has also, at least in Mexico, been more carefully explored by a greater number of scientific travellers and residents; it is therefore not a matter of surprise that the Eastern slope of these countries has offered, so far, more distinct forms and more species to science than the Western, especially among the freshwater shells ‡. In

* Dr. Stoll possesses a specimen of this species from the Hacienda Buenavista, in the upper part of the Cholhuitz district, which has an elevation of 3500 feet (about 1137 m.); this locality was not previously mentioned (*infrà*, p. 55), because I had not seen the example.

† Fischer and Crosse (Miss. Sci. Mex., Moll. ii. p. 678), speaking of the subregion of the Pacific slope, correctly insist on the peculiar geographical range of *Holospira*—the inland portion of Texas, and from Arizona through Coahuila and Chihuahua to the western provinces of Mexico,—corresponding to the range of the Cactacean genera *Cereus* and *Echinocereus* (also *Mammillaria*, see K. Schumann, "Verbreitung der Cactaceæ," Abhandl. Akad. Berlin, 1899). But they go too far in saying that *Holospira* is completely absent from the Atlantic slope of Mexico: San Carlos, the recorded locality in Chihuahua for *H. coahuilensis*, var. *semisculpta*, lies very near to the Rio del Norte, and by far the greater part of Chihuahua and of the adjacent State of Coahuila are drained by the same river to the Atlantic; moreover, *H. teres*, var. *hoegeana*, is found exclusively on the eastern slope of the Mexican tableland (see *infrà*, p. 280), *H. berendti* in the States of Vera Cruz and Chiapas (see *infrà*, p. 281), and *H. veracruziana* near Misantla, also in Vera Cruz (see *infrà*, p. 635).

‡ Fischer and Crosse, in their review of the geographical distribution (Miss. Sci. Mex., Moll. ii. pp. 672, 678), state that the genus *Unio* is wanting ("fait défaut") within Mexico in the streams running to the Pacific; but they mention themselves, in the descriptive part (p. 606), that *Unio poeyanus*, Lea, is found in the Rio Balsas, State of Guerrero, which empties into the Pacific.

Costa Rica and Panama the greater geographical extension belongs to the Pacific slope. One peculiarity of the fauna of the Western slope is worthy of note, viz., the occurrence of peculiar large-sized forms of *Otostomus* or *Bulimulus* in the western part of Mexico, such as *O. dombeyanus*, *O. fenestratus*, and *O. chaperi*, related somewhat to the Andean *O. millegranus* and *O. altoperuvianus*; it is among the land-shells somewhat analogous to the phyto-geographical distribution of the majority of the Cactaceæ.

The submarine Mollusca of the eastern and western shores are of course distinct, more so even than some truly marine shells, as *Tellina rufescens* and *Purpura patula*, but there are remarkably analogous forms among them.

E. v. M.

May 1901.

ERRATA ET CORRIGENDA.

Page	Line	
18	27	*for* 1843 *read* 1883.
22	18	for *H. florida* read *H. flavida*.
28	2	*for* 1779 *read* 1799.
29	15	for *cinctelta* read *cinctella*.
43	23	*for* Plumas *read* Palmas.
76	4	*for* above Jalapa *read* below Jalapa.
93	17	for *G.* read *S.*
95	7	for *G.* read *S.*
105, 114, 119,		*erase the letters* mm. *at the head of the* Anfr. *column in the Tables.*
132	35	*for* CENTRAL *read* WEST.
136	7	for *Höge* read *H. H. Smith*.
141	32	*for* fig. 14 *read* fig. 12 *b*.
154	25	add at end of line (Tab. IX. figg. 6, 6 *a*.)
155	6	*for* figg. 2, 2 *a*–7, 7 *a*. *read* 2–2 *a*–5, 5 *a*, 7, 7 *a*.
171	1	for *tridonia* read *tridonta*.
226	6	add after *albidus*. (Tab. XIV. fig. 15.)
228	9	for *Bulimula* read *Bulimulus*.
283	32	add after **apiostoma**. (Tab. XVII. fig. 4.)
285	16	add after *pulchella*. (Tab. XVII. figg. 3, 3 *a*.)
285	22	add after *salpinx*. (Tab. XVII. fig. 5.)
295	15	*for* Turubanes *read* Turubares.
333	12	*for* concordlalis *read* concordialis.
336	3	for *moerchi* read *mörchi*.
342	1	*for* ASIONIDÆ *read* ARIONIDÆ.
348	12	*for* Strebel *read* P. Strobel.
360	34	*for* figg. 5, 5 *a*, *b*. *read* figg. 5, 5 *a*, 6.
394	10	*for* N. *read* E.
400	8	for *Planorbulina* read *Planorbula*.
402	18	*for* p. 3 *read* p. 321.
444	9	*for* t. 10 *read* t. 14.
451	34	for *Mechychilus* read *Pachychilus*.
471	1	for *Bean* read *Beau*.
472	27	add after *reclivata*. (Tab. XXVIII. fig. 2.)
498	19	*for* figg. 6, 6 *a*–*c*. *read* 6, 6 *a*, *b*.
512	18	*for* p. 103 *read* p. 105.
528		*at head of fifth column in lower Table for* Guatemela *read* Guatemala.
538	29	for *latemarginata* read *latomarginata*.
552	8	*for* figg. 2 *a*, *b*, *c*. *read* figg. 2, 2 *a*, *b*.
556	35	for *Conovalus* read *Conovulus*.
583	4	for *ziczak* read *ziczac*.
588	23	add after **virginea**. (Tab. XXVIII. figg. 11, 12.)
599		*after line* 9 *add* CHONDROPOMA (p. 16).
600	10	for *cordovanm* read *cordovanum*.

BIOLOGIA CENTRALI-AMERICANA.

ZOOLOGIA.

MOLLUSCA.

A. *SPECIES TERRESTRES.*

GASTROPODA PULMONATA DIOICA *.

One pair of feelers, eyes at their base; sexes separated; operculum rarely wanting.

Fam. CYCLOPHORIDÆ.

Operculum circular, formed of numerous narrow whorls, which give it the appearance of concentric structure. Shell depressed or globular, widely umbilicated, generally of simple, somewhat coarse sculpture and brown (pale yellowish to chestnut) hue, concolorous or with a single darker band; peristome straight or (in the American forms rarely) expanded. Size rather large. Regular Tænioglossata as regards the radula.

The Cyclophoridæ have two centres of geographical distribution—one in the East Indies extending to Polynesia (more rich in distinct genera, especially some with complicated structure of the peristome), and the other in Tropical America. In the latter their head-quarters is the tract of the Andes from Mexico to Ecuador; some species are also found in Bolivia and on the east coast of Brazil and Guiana, and (a few) in the Caribbean Islands (about twenty, more especially in Jamaica), but there are none in the Nearctic Region. The two principal genera, *Cyclotus* and *Cyclophorus*, discriminated somewhat artificially by the structure of the operculum, are common to both hemispheres; but there are natural groups or subgenera within each, which are also geographically circumscribed. The subgenus *Cyrtotoma* is confined to Mexico, *Amphicyclotus* to the continent of Central and South America.

* In the arrangement of the letterpress I have tried an innovation by summing up the conchological differences of the species in a common table, instead of giving a separate diagnostical description of each at its place; I believe the comparison and determination will thereby be rendered more easy, as by this method the common and the differential characters of the species are seen at a glance, without referring to different pages. In opposition to the "clavis"-like tables, which are usual in many handbooks, it has the advantage that the student may choose between five or six qualities in beginning the determination, and may take that which is the most striking or the least ambiguous in his specimen.—E. v. M.

Comparative Table of the Species of *Cyclotus* and *Cyclophorus*.

	Operculum.	Sculptura.	Color.	Figura.	Peristoma.	Diam. maj.	Alt.	Apert.	Patria.
irregularis, *Pfr.*	calcareum.	verticaliter confertim striata.	fulvus, opacus.	conoideo-depressa, umbilico lato.	simplex, basi sæpius emarginatum.	mm. 37 – 42	mm. 19 – 26	mm. 18½ – 19	Costa Rica.
bisinuatus, v. *Mart.*	,,	verticaliter undulato-plicatula.	fulvus, nitidulus.	conoideo-subglobosa, umbilico mediocri.	simplex, supra et infra emarginatum.	38½	31	20	Guatemala, Costa Rica.
dysoni, *Pfr.*	,,	verticaliter undulato-rugulosa.	fusco-olivaceus, sericeus.	conoideo-globosa, umbilico mediocri.	simplex, margine supra declivi.	16 – 30	22	14	S.W. Mexico, Guatemala, Honduras, Nicaragua, Costa Rica.
——, var. ambiguus, n....	,,	verticaliter costulato-rugosa.	,,	subdepressa.	,,	23	16	11	E. Mexico.
——, var. affinis, n.	,,	verticaliter undulato-rugosa.	castaneus.	,,	simplex vel subduplex.	20	15	10	S. Panama.
(—— var.?) berendti, *Pfr.*	?	verticaliter confertim subundulato-rugosa.	fusco-lutescens, sericeus.	conoidea, subdepressa, umbilico mediocri.	duplex, solutum.	22½	16	10	Yucatan.
boucardi, *Ang.*	calcareum.	rugis antrorsum ascendentibus.	albus, fasciis 2 fuscis.	conoideo-depressa, umbilico lato.	simplex, intus emarginatum.	33	26	15½	E. Costa Rica.
giganteus, *Sow.*	,,	verticaliter rugoso-striata.	corneo-fulvus, fascia unica infera.	depressa, umbilico perlato.	simplex.	50 – 61	22 – 35	25 – 28	Panama (?)
ponderosus, *Pfr.*	corneum.	rugis antrorsum ascendentibus.	cinereo-fuscus, opacus.	conoideo-depressa, umbilico lato.	simplex.	40	24	18	Guatemala.
maleri, *Cr. & Fisch.*	,,	subtiliter malleato-rugulosa.	pallide olivaceo-fuscus.	,,	,,	26	15	13	S.W. Mexico, Tabasco.
texturatus, *Sow.*	,,	verticaliter undulato-rugosa.	olivaceo-fulvus, opacus.	depressa, umbilico lato.	simplex, margine supero subhorizontali.	35 – 45	20 – 20½	15 – 19	S.W. Mexico, Guatemala.
boucardi, *Pfr.*	,,	malleato-tuberculato-rugosa.	fulvo-fasciatus.	conoideo-depressa, umbilico lato.	simplex.	34	23½	17	E. Mexico.
lutescens, *Pfr.*	,,	verticaliter filoso-striata.	fusco-lutescens, sericeus.	conoideo-globosa, umbilico mediocri.	,,	18 – 20	12 – 15	9 – 10	Mexico, Costa Rica (var.).
cooperi, *Tryon*	?	confertim inciso-striata.	corneus.	conoideo-trochiformis, umbilico lato.	,,	16	12	7	N.W. Mexico.
mexicanus, *Menke*	corneum.	verticaliter confertim striata.	pallide carneus.	depressa, umbilico lato.	incrassatum, intus emargin., lobo infero libero.	20 – 25	12 – 17	8 – 12	E. Mexico.
salleanus, *v. Mart.*	,,	,,	pallide fulvus.	conoideo-depressa, umbilico lato.	expansum, intus emargin., lobo inf. adnato.	25 – 28	15 – 16	12	E. Mexico, S.W. Mexico.
purus, *Forb.*	?	spiratim lirata.	albus.	depressa, umbilico latissimo.	simplex.	51	20		?

CYCLOTUS.

Cyclotus, Guilding, in Swainson's Malac. p. 186 (1840).

Operculum thick, calcareous, many-whorled, nucleus central.

Subgen. APEROSTOMA.

Aperostoma (Troschel), Pfeiffer, in Malak. Blätt. 1847, p. 47.
Neocyclotus, Fischer & Crosse, Miss. Scient. Mex., Mollusca, ii. p. 148 (1889).

Peristome simple, straight.

1. **Cyclotus (Aperostoma) irregularis.**

Cyclostoma (*Cyclotus*) *irregulare,* Pfr. P. Z. S. 1855, p. 117 [1].
Cyclotus irregularis, Pfr. Monogr. Pneum. Vivent. ii. p. 15 [2]; Reeve, Conch. Icon. xiv., *Cyclotus,* t. 4. fig. 18 [3]; Angas, P. Z. S. 1879, p. 483 [4].

Hab. E. COSTA RICA: Costa Rica [2 3] (*Gabb* [4]; *mus. Cuming* [1]); Cache (*Rogers*); "the commonest shell in Talamanca; coast region, and to 500 feet high on the hills" (*Gabb* [4]).

Lower margin of the aperture often injured, probably by the "animal grazing, so to say, to satisfy a demand for lime" [4]. From this circumstance it becomes doubtful whether *C. bisinuatus* is really distinct from *C. irregularis.*

2. **Cyclotus (Aperostoma) bisinuatus.**

Cyclotus bisinuatus, v. Mart. in Malak. Blätt. xi. p. 113, t. 3. figg. 1, 2 (1864) [1], & xv. p. 156 (1868) [2]; Pfr. Monogr. Pneum. Vivent. iii. p. 26 [3].

Hab. S.W. GUATEMALA: Costa Cuca above Retalhuleu; southern slope of "Los Altos," at San Francisco Miramar 2500 feet; and in the district Cholhuitz, on the slope of the Volcan de Santa Maria, at an elevation of from 3000 to 5000 feet, in the woods on the ground, under decayed leaves (*Stoll*).

C. COSTA RICA: elevated plains of Costa Rica (*C. Hoffman* [1 3] *and Carmiol* [2], *in mus. Berol.*).

Outer face of the operculum deepened in the middle; whorls at most six, the inner edge of each prominent in a right angle.

Living animal pale reddish-grey; feelers bright orange, tapering; muzzle produced, bilobed (*Stoll*).

3. **Cyclotus (Aperostoma) dysoni.** (Tab. I. figg. 1, 2, 17.)

Cyclostoma dysoni, Pfr. P. Z. S. 1851, p. 243 [1]; Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, *Cyclostoma,* no. 244, p. 259, t. 35. figg. 5, 6 [2].
Cyclophorus dysoni, Pfr. Monogr. Pneum. Vivent. i. p. 98 [3]; Gray, Cat. Phaneropn. p. 69 [4].
Cyclotus dysoni, Pfr. Monogr. Pneum. Vivent. ii. p. 19 (operculum) [5]; Reeve, Conch. Icon. xiv., *Cyclotus,* t. 6. fig. 31 [6]; v. Mart. P. Z. S. 1875, p. 648 [7]; Angas, P. Z. S. 1879, p. 483 [8].

Platystoma (*Aperostoma*) *dysoni*, Mörch, in Malak. Blätt. vii. p. 66 (1860) [9].

Neocyclotus dysoni, Fischer & Crosse, Miss. Scient. Mex., Mollusca, ii. p. 164, t. 38. figg. 6–8, t. 39. figg. 9–12, t. 41. figg. 1, 2 [10].

Cyclophorus translucidus, Tristr. P. Z. S. 1861, p. 232 [11] (nec Sowerby).

Cyclotus translucidus, Tate, in Am. Journ. Conch. v. p. 159 [12]; Angas, P. Z. S. 1879, p. 483 [13] (nec Sowerby).

Hab. S.W. Mexico: Rio Grande in Oaxaca (*Boucard: Fischer & Crosse* [10], t. 39. f. 12; 21½ millim. in diameter); Istapa and Panistlahuaca in Oaxaca (*Boucard: Fischer & Crosse* [10], t. 39. figg. 9, 10; 20–23 millim. in diameter).

Central Chiapas and Tabasco: Chiapas (*Ghiesbreght* [10]: *var.* umbilico paullum latiore [5]), Teapa (*H. H. Smith*).

Yucatan: Campeche (*Dr. Berendt*); Tabi in N.W. Yucatan (*F. D. G.*; Febr. 1888: very small specimens, 16 millim.). (Tab. I. fig. 2.)

N. Guatemala: Vera Paz (*Salvin* [11]), Coban [7], Tactic and Tamahu (*Sarg* [10]), Alta Vera Paz (*Bocourt, Sarg: Fischer & Crosse* [10], t. 39. f. 11; 30 millim. in diameter), Senahu and San Juan in Vera Paz (*Champion*).

S.W. Guatemala, includ. S.W. Chiapas: Tapachula (*Höge*), San Isidro, Zapote (*Champion*: 19–21 millim.); Low country between Retalhuleu and the sea (*Stoll*).

Honduras (*Dyson* [1 2 3 4 6 10]).

Central Nicaragua: Acoyapa (*Belt*; Dec. 1879); Chontales—forest-region, not uncommon, ascending the Peña Blanca to an elevation of 3000 feet, sparsely distributed in the savana-region (*Tate* [12]).

S.W. Costa Rica: Lepanta, Gulf of Nicoya (*Gabb* [13]); Cervantes—only on hills, not common (*Gabb* [8]); Punta Arenas [9 10] (*Örsted*).

From an inspection of the original specimens, I may be allowed to state that the Vera Paz shell quoted as *C. translucidus* by Tristram [11] is *C. dysoni* and not the true *C. translucidus*, Sowerby; the latter is a closely allied species, and chiefly differs from *C. dysoni* in the sculpture being distinctly more feeble. I, therefore, dare not include *C. translucidus* in the Central-American fauna, although Angas [13] and Tate [12] have also quoted it from within our limits. The true *C. translucidus* is from Venezuela.

Colours of the living animal as in the preceding (*Stoll*).

Var. n. **ambiguus.**

Testa magis depressa, costulis minus undulosis. Diam. 23, alt. 16, apert. 11 millim.

Hab. E. Mexico, Soledad, between Cordova and Orizaba (*Höge*).

Var. n. **affinis.**

Testa magis depressa, sculptura normali, colore castaneo. Diam. maj. 20, alt. 15, apert. 10 millim. (Tab. I. fig. 1.)

Hab. S. Panama, Bugaba (*Champion*).

Var. **berendti.**

Cyclotus berendti, Pfr., in Malak. Blätt. viii. p. 171 (1861)[1]; Monogr. Pne m. Vivent. iii. p. 30[2]; Novit. Conch. ii. p. 232, t. 59. figg. 22, 23[3].

Cyclotus dysoni, var.?, Strebel, Abhandl. Geb. Naturw. Ver. Hamb. vi. 1, pp. 9, 10, t. 1. fig. 3[4].

Hab. YUCATAN, Campeche (*Strebel*[4]). Also recorded from Vera Cruz, from dead shells found on the shore, and from Mirador (*Berendt*[1 2 3])—this locality appears doubtful.

The solution of the aperture and the duplicity of the peristome, which are urged by Pfeiffer as specific characters, are perhaps only an individual aberration. Through the kindness of Dr. H. Dohrn I have had an opportunity of examining Pfeiffer's original specimen: it offers a somewhat campanulated expansion of the last whorl just behind the aperture, and the so-called double peristome appears to be an accidental superstructure somewhat similar to that observed in some examples of *Helix desertorum* (*H. chilembia*, Bourg.). The general form appears rather more depressed than in *C. dysoni*; the sculpture is quite similar. Berendt's other specimens from the same locality agree with it in the general shape, but want the superstructure of the peristome, therefore I have quoted them among *C. dysoni*.

Fischer and Crosse's *Neocyclotus berendti* (t. 38. fig. 4) does not agree with Pfeiffer's specimen, and may be also a variety of *C. dysoni*; these authors also give "Boom, Belize river, British Honduras (*Berendt*)" as a locality.

4. **Cyclotus (?) boucardi.**

Cyclotus boucardi, Angas, P. Z. S. 1878, p. 73, t. 5. figg. 3, 4[1], and 1879, p. 483[2].

Hab. E. COSTA RICA: San Carlos (*Boucard*[1]); mouth of Banana river, five miles from Limon (*Gabb*[2]).

The operculum seems to be unknown, and as Angas[1] compares the structure of the peristome with that of *Cyclophorus* (not *Cyclotus*) *mexicanus*, the genus of this species remains to be confirmed by the discovery of the operculum.

CYCLOPHORUS.

Cyclophorus, Montfort, Conch. Syst. ii. p. 290 (1810).

Operculum thin, corneous.

Subgen. AMPHICYCLOTUS, Fischer & Crosse.

Amphicyclotus, Fischer & Crosse, in Journ. de Conch. xxvii. p. 46 (1879).

Edge of the aperture thin, straight.

1. **Cyclophorus (Amphicyclotus) ponderosus.**

Cyclostoma stramineum, Morelet, in litt. (nec Sow.)[1].

Cyclostoma ponderosum, Pfr. P. Z. S. 1851, p. 243 [2], and in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, *Cyclostoma*, no. 242, p. 257, t. 35. figg. 12, 14 [3].

Cyclophorus ponderosus, Pfr. Monogr. Pneum. Vivent. i. p. 97 [4]; Gray, Cat. Phaneropn. p. 68 [5]; Tristr. P. Z. S. 1861, p. 232 [6]; v. Mart. P. Z. S. 1875, p. 648 [7]; Reeve, Conch. Icon. xiii., *Cyclophorus*, t. 15. fig. 70 [8].

Amphicyclotus ponderosus, Fischer & Crosse, Miss. Scient. Mex., Mollusca, ii. p. 147, t. 35. fig. 3 [9].

Hab. N. Guatemala (*Morelet* [3 4 5 6 8]; *mus. Cuming* [2]; *Sarg* [9]), Coban (*Salvin* [7]), Senahu (*Champion*).

The specimen delineated by Reeve has a yellowish band, which is wanting in other specimens.

2. Cyclophorus (Amphicyclotus) maleri.

Amphicyclotus maleri, Crosse & Fischer, in Journ. de Conch. xxxi. p. 102 (1883) [1]; Miss. Scient. Mex., Mollusca, ii. p. 145, t. 41. f. 3 [2].

Hab. S.W. Mexico: Santa Efigenia, Tehuantepec (*Sumichrast* [2]); Tabasco (*Maler* [1 2]).

3. Cyclophorus (Amphicyclotus) texturatus.

Cyclostoma texturatum, Sow. Thes. Conch. Suppl. no. 182, p. 160*, t. 31 A. fig. 303 [1]; Pfr. in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, *Cyclostoma*, no. 243, p. 258, t. 35. figg. 10, 11 [2].

Cyclophorus texturatus, Pfr. Monogr. Pneum. Vivent. i. p. 97 [3]; Gray, Cat. Phaneropn. p. 68 [4]; Reeve, Conch. Icon. xiii., *Cyclophorus*, t. 15. fig. 67 [5]; v. Mart. P. Z. S. 1875, p. 648 [6].

Amphicyclotus texturatus, Fischer & Crosse, Miss. Scient. Mex., Mollusca, ii. p. 144, t. 35. fig. 2, & t. 38. fig. 3 [7].

Hab. S.W. Mexico: Tehuantepec (*Sumichrast* [7]); Cerro de Plumas, near Puerto Angel, tropical forest (*Höge*).

N. Guatemala [1 2 3 4 5]: Coban (*Salvin* [6]); at the side of the road between Tactic and Tamahu (*Sarg* [7]).

4. Cyclophorus (Amphicyclotus) boucardi.

Cyclostoma (*Cyclophorus*) *boucardi*, Pfr. P. Z. S. 1856, p. 323, t. 35. fig. 25 [1]; Monogr. Pneum. Vivent. ii. p. 65 [2].

Amphicyclotus boucardi, Fischer & Crosse, Miss. Scient. Mex., Mollusca, ii. p. 142, t. 35. fig. 1 [3].

Hab. E. Mexico: Cordova in the State of Vera Cruz (*Sallé* [1 2 3], *Höge*).

5. Cyclophorus (Amphicyclotus) lutescens.

Cyclostoma (*Cyclophorus*) *lutescens*, Pfr. P. Z. S. 1851, p. 250 [1].

Cyclostoma lutescens, Pfr. in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, *Cyclostoma*, no. 345, p. 333, t. 43. figg. 12–14 [2].

Cyclophorus lutescens, Pfr. Monogr. Pneum. Vivent. i. p. 82 [3], & iii. p. 69 [4]; Gray, Cat. Phaneropn. p. 56 [5]; Reeve, Conch. Icon. xiii., *Cyclophorus*, t. 16. figg. 75 [6]; Angas, P. Z. S. 1879, p. 483 [7].

Habropoma lutescens, Fischer & Crosse, Miss. Scient. Mex., Mollusca, ii. t. 38. fig. 2.
Amphicyclotus lutescens, Fischer & Crosse, loc. cit. p. 139 [8].
Cyclotus cooperi, Tryon, Proc. Acad. Phil. 1863, p. 281, t. 2. fig. 2 [9]; Pfr. Monogr. Pneum. Vivent. iv. p. 30 [10].

Hab. N.W. Mexico: Mazatlan in Sinaloa (*Rémond* [9 10]).
S.W. Mexico: Panistlahuaca in the State of Oaxaca, near the Rio Verde (*Boucard* [4 8]).
Var. (?): W. Costa Rica, Lepanta near Nicoya (*Gabb* [7]).

I cannot make out any difference of importance in the description and figure of *C. cooperi* to distinguish it from *C. lutescens*; but as I have not seen an original specimen of the former the identity remains to be confirmed.

One of Gabb's specimens in the British Museum has still its operculum; it is thin and horny (*Edgar Smith, in litt.*).

Pfeiffer [1 2 3] first gave Brazil as a locality for this species (and this is the locality mentioned by Gray [5] and Reeve [6]), but subsequently [4 10] changed it to Mexico.

Subgen. Cyrtotoma, Mörch (1852).

Habropoma, Fischer & Crosse (1886).

Peristome thickened, distinctly notched at its insertion into the penultimate whorl.

6. Cyclophorus (Cyrtotoma) mexicanus.

Cyclostoma mexicanum, Menke, Synops. Moll. ed. 2, pp. 39, 133 (1830)[1]; Philippi, Abbild. i. 5, p. 104, t. 1. fig. 4 [2]; Pfr. in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, *Cyclostoma*, no. 49, p. 56, t. 7. figg. 21, 22 [3]; Sowerby, Thes. Conch. no. 64, p. 112, t. 25. fig. 93 [4].
Cyclotus mexicanus, Gray, List Cycloph. p. 9 [5], and Cat. Phaneropn. p. 19 [6]; Pfr. Monogr. Pneum. Vivent. i. p. 34 [7].
Cyclophorus mexicanus, Pfr. Monogr. Pneum. Vivent. ii. p. 55 [8] (excl. var.); v. Mart. in Malak. Blätt. xii. pp. 4, 151 (1865) [9]; Strebel, Abhandl. Geb. Naturw. Ver. Hamb. vi. 1, p. 8, tabb. 1, 1 *a*. figg. 1, 1 *a*, 1 *b* [10].
Habropoma mexicanum, Fischer & Crosse, Miss. Scient. Mex., Mollusca, ii. p. 130, t. 35. fig. 5 [11].

Hab. E. Mexico [5], Papantla, north of Vera Cruz, in the woods (*Deppe* [9 11] *& Schiede* [3 6 7 9 11]); Misantla in the State of Vera Cruz, copiously [11]; Cuesta de Misantla (*M. Trujillo*); Jalapa (*Höge*).
S.W. Mexico: Playa Vicente and Tustepec, in the State of Oaxaca (*Sallé* [11]); Cerro de Plumas in the same State (*Höge*).

7. Cyclophorus (Cyrtotoma) salleanus.

Cyrtotoma mexicanum (Menke), Mörch, Cat. Yoldi, p. 40 (1852) [1]; H. & A. Adams, Gen. Rec. Moll. ii. p. 176 [2].
Cyclophorus mexicanus β, Pfr. Monogr. Pneum. Vivent. ii. p. 55 [3].
Cyclophorus salleanus, v. Mart. in Malak. Blätt. xii. p. 151 (1865) [4]; Strebel, Abhandl. Geb. Naturw. Ver. Hamb. vi. 1, p. 9, tabb. 1, 1 *a*. figg. 2, 2 *a* [5]; Pfr. Monogr. Pneum. Vivent. iv. p. 109 [6].

Habropoma (*Cyrtotoma*) *salleanum*, Fischer & Crosse, Miss. Scient. Mex., Mollusca, ii. p. 133, t. 35. fig. 4, t. 38. fig. 1 [7].

Hab. E. Mexico: Cordova in the State of Vera Cruz (*Sallé* [3 4 6 7]); Barranca de Santa Maria, near Mirador (*Berendt* [5 7]); Orizaba (*Strebel* [5 7]); Misantla (*Strebel* [7], *Höge*); Quilate near Misantla, Atoyac, Coatepec (*Höge*); Jalapa (*M. Trujillo*, *W. Richardson*).

Having now before me seven adult specimens of *C. salleanus* and five of *C. mexicanus*, in addition to those which I examined in 1865, I am enabled to add the following to the differences already given [*cf.* Malak. Blätt. xii. p. 152 (1865)]:—The lower lobe of the columellar margin beneath the deep notch is always free in *C. mexicanus*, and soldered to the penultimate whorl in *C. salleanus*; this seems to be a constant character. The break of contiguity in the upper suture just before the aperture, on the contrary, is not constant in *C. salleanus* and is to be seen also in two specimens of *C. mexicanus*; in these two even the upper lobe of the columellar margin is free (not soldered), but in the other three examples of *C. mexicanus*, and in all those of *C. salleanus*, it is soldered to the penultimate whorl. The peculiar swelling and more coarse sculpture near the suture are connected with its disunion of contiguity and are distinctly visible in five specimens of *C. salleanus*; but are rather indistinct in the two other examples of this species and altogether wanting in all the specimens of *C. mexicanus*, also in those in which the suture is not contiguous near the aperture. Concerning the prominence of the apex of the spire there is no trustworthy difference; often it is broken. The margin of the aperture is somewhat reflexed above—outside and below in *C. salleanus*, only thickened but not reflexed in *C. mexicanus*; there are, however, some gradations in this respect in both. The smallest specimen of *C. salleanus* (diam. maj. $24\frac{1}{2}$ millim., aperture included) is equal in size to the largest example of *C. mexicanus*. The colour is a pale reddish in all whorls, or at least in those except the last (not decorticated), in *C. salleanus*, pale yellow or brownish in *C. mexicanus*; if, however, the upper whorls are worn, a reddish hue is to be seen in them also in this latter species.

Species of Cyclotus *and* Cyclophorus *with doubtful locality.*

Cyclotus giganteus.

Cyclostoma giganteum, Sow. P. Z. S. 1843, p. 30 [1]; Thes. Conch. i. p. 92, t. 23. figg. 8, 9 [2]; Reeve, Conch. Syst. ii. t. 184. fig. 17 [3]; Pfr. in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, *Cyclostoma*, no. 2, p. 11, t. 1. figg. 11–14 [4].

Cyclotus giganteus, Gray, List Cycloph. p. 6 [5], and Cat. Phaneropn. p. 7 [6]; Pfr. Monogr. Pneum. Vivent. i. 16 [7]; Hidalgo, Viaje al Pacífico, Moluscos, i. p. 144, t. 8. figg. 9–11 [8]; Reeve, Conch. Icon. xiv., *Cyclotus*, t. 1. fig. 3 [9].

Hab. Panama: near Panama, in woods [1 4 7 9].

All later discovered localities for this species are situated beyond the limits of

Central America, in Colombia south of the Isthmus of Panama, or Ecuador, viz.:—Marmato on the river Cauca, 5½° N. lat. (*Bland*), Quito and Agua Rica in Ecuador (*Paz* and *Martinez*), Santa Elena [5 6 7] near Guayaquil (*Cuming*), Salanga, north of Guayaquil (*Jay* [6]).

Cyclophorus (?) purus.

Cyclostoma purum, Forbes, P. Z. S. 1850, p. 56, t. 9. fig. 9 [1] (copied in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, *Cyclostoma*, no. 226, p. 245, t. 32. figg. 14, 15).

Cyclophorus purus, Pfr. Monogr. Pneum. Vivent. i. p. 93 [2]; Gray, Cat. Phaneropn. p. 65 [3]; Reeve, Conch. Icon. xiii., *Cyclophorus*, t. 7. fig. 28 [4].

Precise locality unknown [1]. It was found by Captain Kellett and Lieut. Wood, during the surveying voyages of the 'Herald' and 'Pandora' on the western coast of America, somewhere between Ecuador and Vancouver Island; and it has been therefore ascribed to Central America [4]. But nobody has again met with it. The nearest allied species is *C. cumingi*, Sow., from the island of Tumaco, on the borders of Ecuador and Colombia; and perhaps *C. purus* may be only a variety of it (*cf.* Pfr. Monogr. Pneum. Vivent. iii. p. 73).

MEGALOMASTOMA.

Megalomastoma, Guilding, in Swainson's Malac. p. 186 (1840).

Shell elongated, pupiform. Operculum as in *Cyclophorus*. Tip of the shell often truncated.

Subgen. Tomocyclus, Crosse & Fischer.

Tomocyclus, Crosse & Fischer, in Journ. de Conch. xx. p. 76 (1872).

Peristoma duplex, externum ad insertionem excisum.

This subgenus is confined to Central America.

	Sculptura.	Basis.	Peristoma.	Long.	Diam., excl. apert.
gealei, *Cr. & Fisch.*	arcuatim costulata.	funiculato-carinata.	dilatatum, anguste et flexuose excisum.	mm. 39–43	mm. 11½–12½
simulacrum, *Morel.*	sublævis.	,,	latiuscule emarginatum, appressum.	30–45	9–11
——, var. cobanense, *Sow.*	,,	,,	,,	20–28	7½–9
——, var. gracilius	,,	,,	,,	30	5
guatemalense, *Pfr.*	striatula.	compressa nec carinata.	perangustum, excisum.	24	8

1. **Megalomastoma (Tomocyclus) gealei.**

Tomocyclus gealei, Crosse & Fischer, in Journ. de Conch. xx. p. 77 (1872) [1]; Pfr. Monogr. Pneum. Vivent. iv. p. 139 [2]; Fischer & Crosse, Miss. Scient. Mex., Mollusca, ii. p. 118, t. 40. figg. 1–3 [3].

Hab. Chiapas (*Boucard* [1 2 3]).

N. Guatemala: woods between Tactic and Tamahu, Alta Vera Paz (*Sarg* [3]); Polochic valley above Panzos and Senahu (*Champion*).

2. **Megalomastoma (Tomocyclus) simulacrum.**

Cyclostoma simulacrum, Morelet, Test. Noviss. i. p. 22 [1]; Pfr. in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, *Cyclostoma,* no. 256, p. 267, t. 36. figg. 11, 12 [2].

Megalomastoma simulacrum, Gray, Cat. Phaneropn. p. 92 [3]; Pfr. Monogr. Pneum. Vivent. i. p. 131 [4]; Sow. Thes. Conch. iii. t. 263. figg. 3, 4 [5]; Tristr. P. Z. S. 1861, p. 232 [6].

Megalomastoma (*Tomocyclus*) *simulacrum,* v. Mart. P. Z. S. 1875, p. 649 [7].

Tomocyclus simulacrum, Crosse & Fischer, Journ. de Conch. xx. p. 76 (1872) [8]; Pfr. Monogr. Pneum. Vivent. iv. p. 140 [9]; Fischer & Crosse, Miss. Scient. Mex., Mollusca, ii. p. 121, t. 40. fig. 9 [10].

Hab. N. Guatemala [5 6 8 9]: woods near San Luis in Peten (*Morelet* [1 10]); Coban (*Salvin* [7]); between Tactic and Tamahu (*Sarg* [10]); Vera Paz [2 3 4].

Var. **minus.**

Cyclostoma copanense, Sow. Thes. Conch. Suppl. i. p. 165, t. 31 B. figg. 310, 311 [11]; Pfr. Monogr. Pneum. Vivent. i. p. 132 [12].

Tomocyclus simulacrum, var. *β,* Fischer & Crosse, loc. cit. t. 40. figg. 4, 5, 7, 8, 10 [13].

Hab. N. Guatemala: Coban [11] (*Morelet* [13]); Alta Vera Paz [12] (*Bocourt* [13]); Senahu (*Champion*).

Var. **gracilius.**

Tomocyclus simulacrum, var. δ, Fischer & Crosse, loc. cit. t. 40. fig. 6 [14].

Hab. N. Guatemala: between Tactic and Tamahu, in the woods (*Sarg* [14]).

Fischer and Crosse (*l. c.* p. 120) insist on the specific differences between *M. gealei* and *M. simulacrum,* on the ground that in *M. gealei* the upper part of the peristome is never joined nor soldered to the preceding whorl; but we have an intermediate specimen collected at Senahu by Mr. Champion, distinctly costulated as *M. gealei*, in which the upper edge of the peristome is really joined to the penultimate whorl. Of course this is only the consequence of a somewhat larger development of the broad peristome, and of less specific value than the sculpture of the whole shell.

The var. *gracilius* approaches somewhat *M. guatemalense.*

The thread-like basal carina is more or less distinctly expressed in various specimens: in one, which was broken during life, there is no trace of it to be seen; it disappears in

all near the aperture. The expansion of the outer peristome is quite even in some specimens, in others somewhat concave. The notch at the junction with the penultimate whorl is always narrower at its commencement and somewhat widened more behind, but in different degrees in various specimens; the outer lobe of the peristome reaches always the penultimate whorl and is more or less appressed to it; the inner (left) lobe remains free of it, although it comes very near in some examples. The chief character of *M. gealei* lies in the sculpture of the shell, but this is also subject to some gradation according to the specimens; generally, the outer lobe of the peristome is free in *M. gealei*, or touches only the penultimate whorl; the borders of the notch form a perpendicular wall which reaches the basal keel, but this is also to be seen in some specimens of *M. simulacrum* and not in all of *M. gealei*. Finally, the separation of the last whorl from the suture near the aperture is more distinct in *M. gealei* than it is in *M. simulacrum*. By comparing more specimens (three of *M. gealei*, seven of *M. simulacrum*), however, all these differences prove to be very gradual, so that the right of *M. gealei* as a distinct species appears rather contestable.

3. **Megalomastoma (Tomocyclus) guatemalense.**

Cyclostoma guatemalense, Pfr. P. Z. S. 1851, p. 245 [1]; Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, *Cyclostoma*, no. 257, p. 267, t. 36. figg. 13, 14 [2].

Megalomastoma guatemalense, Pfr. Monogr. Pneum. Vivent. i. p. 132 [3]; Gray, Cat. Phaneropn. p. 92 [4]; Sow. Thes. Conch. iii. t. 263. fig. 6 [5].

Tomocyclus guatemalensis, Crosse & Fischer, Journ. de Conch. xx. p. 76 (1872) [6]; Pfr. Monogr. Pneum. Vivent. iv. p. 140 [7]; Fischer & Crosse, Miss. Scient. Mex., Mollusca, ii. p. 124, t. 40. figg. 11 [8].

Hab. S.E. Mexico: San Martin Tuxtla, in the south of the State of Vera Cruz (*Boucard*, *Sallé* [8]).

N. Guatemala [5 7], Vera Paz [2 3 4] (*mus. Cuming* [1]).

Megalomastoma guildingianum.

Cyclostoma guildingianum, Pfr. in Zeitschr. f. Malak. 1851, p. 28; Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, *Cyclostoma*, no. 218, p. 239, t. 31. figg. 25, 26.

Megalomastoma guildingianum, Pfr. Monogr. Pneum. Vivent. i. p. 134; Gray, Cat. Phaneropn. p. 94.

Locality unknown. Pätel (Catalog. d. Conchyliensammlung, 1873, p. 120) cites Guatemala with a ?; but nobody, so far as I know, has ever reported it thence. Very probably it belongs to one of the West-Indian islands.

Fam. CYCLOSTOMIDÆ.

The Cyclostomidæ are characterized by a generally oblong finely sculptured shell of reddish-grey colour, often with brown interrupted bandlets or rows of spots; and, chiefly, by the operculum being of a rather ovate subangular form and composed of few spiral whorls. They are generally smaller in size than the Cyclophoridæ. As regards the radula they are also Tænioglossata, but the outer plates are often provided with many deep notches, so that they may be looked upon as forming a sort of transition to the Rhipidoglossata (Helicinidæ).

Their geographical distribution is very peculiar, extending (1) over the whole of Africa, with Madagascar and Arabia, Southern and Western Europe, and (2) Central America; they are very plentiful in the larger islands of the West Indies, especially in Cuba (136 species) and Jamaica (66 species), and are also represented in nearly all the small islands, from the Bahamas to Trinidad (about 56 species). The species found on the continent of America are comparatively few in number, and they do not extend to any notable distance from the Caribbean Sea: five are found on the shores of Venezuela, two (so far as we know) in British Guiana, but one in Ecuador (*Chondropoma aspratile*, Morel.), and one is said to come from Bolivia (*Cistula thoreyana*, Phil.); this last statement, however, requires confirmation, as it dates from 1851 and has not since been verified. Not one is known from Cayenne or Brazil. It appears, therefore, that the Cyclostomidæ follow chiefly the chain of the Andes.

In the United States, one species is found in Florida, which, as is well known, pertains more to the Caribbean than to the Nearctic fauna. Within the limits of Mexico and Central America we know at most seventeen, or, including all doubtful ones, twenty-one species:—one or two only from north of the Isthmus of Tehuantepec, most of them (not only as regards species, but in the number of individuals) in Yucatan, Guatemala, and Honduras, that is to say, in the large tropical wooded countries which drain into the Caribbean Sea and are moistened by winds from that quarter. In Mexico (Yucatan excepted) the only precisely known localities are Cordova and Atoyac in the province of Vera Cruz, both on the eastern slope. It is very remarkable that hitherto no special locality situated on the western slope is known as a "habitat" of a species of Cyclostomidæ; only the vague statement "Isthmus of Tehuantepec" and the quite general ones "Mexico," "Chiapas," "Guatemala" suggest the possibility that some species may perhaps also be found on the western slope.

The most elevated locality known to me is Coban in northern Guatemala, *Chondropoma rubicundum* being found there as well as at a lower elevation.

The genera are not at all distinct from those prevailing in the islands of the Caribbean Sea; but not all Caribbean genera are represented on the continent of America—for example, *Cyclostoma* proper (*Tudora*?), *Licina*, *Ctenopoma*, *Jamaicia*. The geogra-

phical extension of the species appears to be rather limited; not one of those inhabiting Mexico and Central America is known to live also in the West-Indian Islands or in South America; and even within our limits each species is as yet known only from one province or, in a few cases, from two neighbouring ones.

As the general facies of both genera (*Choanopoma* and *Chondropoma*) is very much alike, and they are discriminated only by the structure of the operculum, we give on pages 14, 15 one comparative table for the species of both.

CHOANOPOMA.

Choanopoma, Pfeiffer, in Zeitschr. f. Malak. 1847, p. 45.

This genus is characterized by the elevated edges of the whorls in the operculum; the operculum itself is somewhat more circular than in *Cyclostoma* proper and in *Chondropoma*; the shell is generally ovate, with swollen whorls divided by deep sutures, pale-coloured, and sharply sculptured. For the distinctive characters of the species see the table on p. 14.

a. *Last whorl adhering to the preceding in its whole length.*

1. **Choanopoma trochleare.**

Cyclostoma trochlea, Pfr. P. Z. S. 1851, p. 249 [1].

Cyclostoma trochleare, Pfr. in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, *Cyclostoma*, no. 315, p. 311, t. 41. figg. 7, 8 [2].

Cistula (?) *trochlearis*, Pfr. Monogr. Pneum. Vivent. i. p. 275, & ii. p. 135 [3]; Gray, Cat. Phaneropn. p. 194 [4].

Chondropoma trochleare, Reeve, Conch. Icon. xiv., *Chondropoma*, t. [illegible]. fig. 82 [5].

Var. **majus.**

Choanopoma chiapasense, Fischer & Crosse, Miss. Scient. Mex., Mollusca, ii. t. 41. fig. 8 (letterpress not yet published) [6].

Hab. Chiapas [5 6] (*Ghiesbreght* [4]).

The original locality was unknown to Pfeiffer [1].

2. **Choanopoma sumichrasti.**

Choanopoma sumichrasti, Crosse & Fischer, in Journ. de Conch. xxii. p. 283 (1874) [1]; Pfr. Monogr. Pneum. Vivent. iv. p. 156 [2]; Fischer & Crosse, Miss. Scient. Mex., Mollusca, ii. t. 41. fig. 9 (letterpress not yet published).

Hab. S.W. Mexico: Isthmus of Tehuantepec (*Sumichrast* [1 2]).

Comparative Table of the Species of *Choanopoma* and *Chondropoma*.

	Operculum.	Forma.	Sculptura.	Sutura.	Color.	Peristoma.	Long.	Diam.	Apert., excl. perist.	Patria.
trochleare, *Pfr.*	lamelloso-spiratum, calcareum.	turrita, truncata.	cancellata.	simplex, profunda.	pallide fulvus, fasciolis rufis obsoletis.	duplex, latiuscule expansum, crenulatum.	mm. $12\frac{1}{2}$ | 14 | 16	mm. $7\frac{1}{2}$ | $9\frac{1}{2}$	mm. 4 | $5\frac{1}{2}$	Chiapas.
sumichrasti, *Cr. & Fisch.*	,,	,,	verticaliter dense costulata.	simplex.	flavo-fulvus, fasciis 2 fuscis.	duplex, angustum.	$13\frac{1}{2}$	8	5	Tehuantepec.
rigidulum, *Morel.*	,,	oblonga, truncata, anfr. ult. solutus.	verticaliter lamelloso-costulata.	simplex, profunda.	griseus, fasciolis rufescentibus subinterruptis.	duplex, breviter expansum, supra angulatum.	7 | 10	4 | 5	$2\frac{1}{2}$ | 3	Guatemala.
osberti, *Tristr.*	,,	subturrita, truncata, anfr. ult. solutus.	verticaliter leviter striata.	simplex, profundiuscula.	griseo-fulvus, maculis rufis seriatis, perist. aurantio.	duplex, subexpansum, supra angulatum.	10 | 12	$5\frac{1}{2}$ | 6	4	Guatemala.
pleurophorum, *Pfr.* ...	corneo-calcareum, planum.	globoso-conica, *umbilico angulato.*	verticaliter costulata.	simplex, sat profunda.	pallide fulvus.	simplex, breviter expansum.	12	$11\frac{1}{2}$	$6\frac{1}{2}$	Honduras.
gruneri, *Pfr.*	,,	oblongo-conica, truncata.	nitidula, spiratim dense striata, liris verticalibus distantibus.	simplex.	,,	duplex, late expansum, radiato-striatum.	19 | 21	12 | 14	6 | 7	Honduras.
radiosum, *Morel.*	,,	,,	nitidula, spiratim lirata, lineolis verticalibus confertissimis.	,,	fulvus, fasciolis fuscis, perist. radiato.	duplex, late expansum, concentrice plicatulum.	15 | 17	$8\frac{1}{2}$ | 9	5	Guatemala.
andrewsæ, *Ancey*	?	,,	confertim verticaliter costulata.	subtiliter denticulata.	rufo-fuscus.	duplex, expansum, concentrice rugulosum.	11	8	4	Honduras.
sargi, *Cr. & Fisch.*	corneo-calcareum.	,,	echinato-decussata.	simplex.	pallide fulvus, fasciolis rufis interruptis, perist. maculato.	,,	$14\frac{1}{2}$	8 | 9	5 | 6	Guatemala.

küsteri, *Pfr.*	?	oblonga, pupæformis, truncata.	granulato-reticulata.	simplex.	rufo-fuscus, fasciolis obsoletis, perist. radiato.	duplex, campanulato-expansum.	15	8	5	Honduras.
grateloupi, *Pfr.*	corneo-calcareum.	„	decussata, lineis verticalibus validioribus.	grosse fasciculatim denticulata.	carneo-griseus, maculis fuscis 4-seriatis.	duplex, subsolutum, latiusculum, subauriculatum.	12 | 16	7 | 8	$4\frac{1}{2}$ | 5	Yucatan.
largillierti, *Pfr.*	„	„	decussata, lineis verticalibus magis confertis.	grosse denticulata.	carneo-griseus, fasciolis fuscis interruptis.	duplex, subsolutum, angustiusculum, vix auriculatum.	11 | 13	7	4	Yucatan.
rubicundum, *Morel.* ...	corneum.	oblongo-turrita, integra.	verticaliter confertim costulata, anfr. ult. sublævi.	simplex, profundiuscula.	fulvo-rufus, apice nigricante, perist. rubro.	duplex, subangustum.	11 | 13	7 | $7\frac{1}{2}$	$4\frac{1}{2}$	Guatemala.
subangulatum, *v. Mart.*	corneo-calcareum.	oblongo-turrita, subangulata, integra.	verticaliter costulata.	simplex.	griseo-corneus, fasciolis fuscis multis interruptis.	„	$10\frac{1}{2}$ | 12	7 | 8	$3\frac{1}{2}$ | 4	Guatemala.
acerbulum, *Morel.*	corneum.	turrita, integra.	verticaliter costulata, anfr. ult. sublævi.	„	corneo-griseus, fasciolis fuscis subinterruptis.	„	8 | 10	$5\frac{1}{2}$ | 6	$2\frac{1}{2}$	Guatemala.
cordovanum, *Pfr.*	„	conico-turrita, integra.	verticaliter plicato-costulata.	„	flavo-fulvus, fasciolis interruptis, perist. maculato.	„	$15\frac{1}{2}$	8	$5\frac{1}{2}$	E. Mexico.
vespertinum, *Morel.* ...	„	turrita (sæpius truncata).	decussata.	denticulata.	griseo-fuscus, fasciolis fuscis interruptis.	simplex, breviter expansum.	20 | 21	9	7	S.E. Mexico.
turritum, *Pfr.*.....	corneo-calcareum.	turrita, subtruncata.	subtiliter cancellata.	confertim denticulata.	pallide fulvus, fasciolis albo- et fusco-articulatis.	subduplex, breviter expansum, supra dilatatum.	14 | 17	6 | 8	$4\frac{1}{2}$ | $5\frac{1}{2}$	Honduras.
truncatum, *Wiegm.* ...	corneum.	turrita, truncata.	eleganter decussata.	denticulata.	fulvus, maculis rufo-fuscis.	duplex, expansum.	14	$6\frac{1}{2}$	4	Mexico.
planospira, *Pfr.*	calcareum, oblique striatum.	oblongo-turrita, truncata, anfr. ult. breviter solutus.	verticaliter confertissime striata.	simplex.	albido-fulvescens.	simplex, breviter expansum.	$14\frac{1}{2}$	$6\frac{1}{2}$?	$5\frac{1}{2}$	? Mexico.

b. *Last whorl disconnected from the preceding near the aperture.*

3. **Choanopoma rigidulum.** (Tab. I. fig. 3.)

Cyclostoma rigidulum, Morelet, Test. Noviss. ii. p. 18[1].
Cistula rigidula, Pfr. Monogr. Pneum. Vivent. ii. p. 134[2]; Gray, Cat. Phaneropn. p. 191[3].
Adamsiella rigidula, Fischer & Crosse, Miss. Scient. Mex., Mollusca, ii. p. 176, t. 42. fig. 12.

Hab. N. Guatemala: province of Vera Paz [2 3], in rocky localities (*Morelet* [1]).

4. **Choanopoma osberti.**

Adamsiella osberti, Tristr. P. Z. S. 1861, p. 232[1]; Pfr. Monogr. Pneum. Vivent. iii. p. 120[2]; Fischer & Crosse, Miss. Scient. Mex., Mollusca, ii. t. 42. fig. 13 (letterpress not yet published).

Hab. Guatemala (*Salvin* [1 2]).

The operculum is thick, calcareous, with prominent edges of the single whorls.

The genus *Adamsiella* has been distinguished by Pfeiffer from *Chondropoma* by its operculum being cartilaginous instead of calcareous; but this difference is effaced by gradual transitions. A specimen of *C. rigidulum* from Pätel's collection, now in the Berlin Museum, exhibits a thick calcareous operculum. The majority of Pfeiffer's species of *Adamsiella* have the last whorl not disconnected from the preceding.

CHONDROPOMA.

Chondropoma, Pfeiffer, in Zeitschr. f. Malak. 1847, p. 109.

Operculum cartilaginous, either throughout or with a thin calcareous layer outside (*Cistula*, Pfr.). Shell conical, ovate or elongate, with varying sculpture, often of a reddish colour with brown interrupted bands.

a. *Sculpture vertical only.*

aa. *Shell conical.*

1. **Chondropoma pleurophorum.**

Cyclostoma pleurophorum, Pfr. P. Z. S. 1851, p. 245[1]; Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, *Cyclostoma,* no. 299, p. 299, t. 40. figg. 5, 6[2].
Cistula pleurophora, Pfr. Monogr. Vivent. i. p. 262[3]; Gray, Cat. Phaneropn. p. 183[4].

Hab. Honduras [1 2 3 4]: probably collected by Dyson.

Very distinct from all the following by the short conical form and the wide angulated umbilicus.

2. **Chondropoma andrewsæ.** (Tab. I. fig. 4.)

Cyclostoma andrewsæ, Ancey, in Annales de Malacol. ii. p. 251 (1886)[1].

Hab. Gulf of Honduras [1].

bb. *Shell oblong.*

3. **Chondropoma subangulatum.** (Tab. I. fig. 5.)

Cistula subangulata, v. Mart. Sitzungsb. Ges. naturf. Freunde Berlin, 1886, p. 162[1].

Hab. N. GUATEMALA: Teleman in the Polochic valley (*Stoll*[1]); Senahu 2500 feet, in the same valley, above Panzos, copiously, in very humid forest (*Champion*).

Approaches in general features the following, but is distinguished by the subangulate or even angulate upper whorls and the pale colour.

4. **Chondropoma rubicundum.**

Cyclostoma rubicundum, Morelet, Test. Noviss. i. p. 22[1]; Pfr. in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, *Cyclostoma*, no. 273, p. 280, t. 37. figg. 29, 30[2].

Chondropoma rubicundum, Pfr. Monogr. Pneum. Vivent. i. p. 291[3]; Gray, Cat. Phaneropn. p. 207[4]; Tristr. P. Z. S. 1861, p. 232[5]; v. Mart. P. Z. S. 1875, p. 649[6]; Reeve, Conch. Icon. xiv., *Chondropoma*, t. 6. fig. 47 (not good)[7]; Fischer & Crosse, Miss. Scient. Mex., Mollusca, ii. t. 41. fig. 5 (letterpress not yet published).

Hab. N. GUATEMALA[7]: province of Peten and Vera Paz[2 4], on the leaves of trees (*Morelet*[1 3]); Coban, Vera Paz (*Salvin*[5 6]); lower valley of the Polochic (*Stoll*).

Somewhat variable in size and colour, ordinarily of a distinct red hue, the top dark bluish or nearly black.

5. **Chondropoma cordovanum.**

Cyclostoma (*Chondropoma*) *cordovanum*, Pfr. P. Z. S. 1856, p. 323[1].

Chondropoma cordovanum, Pfr. Novit. Conch. i. p. 91, t. 25. figg. 18, 19[2]; Monogr. Pneum. Vivent. ii. p. 145[3]; Reeve, Conch. Icon. xiv., *Chondropoma*, t. 4. fig. 24[4].

? *Chondropoma cordovanum*, Fischer & Crosse, Miss. Scient. Mex., Mollusca, ii. t. 41. fig. 6 (letterpress not yet published).

Hab. E. MEXICO: Cordova, State of Vera Cruz (*Sallé*, *Höge*[1 3 4]); Atoyac (*Höge*).

cc. *Shell elongate.*

6. **Chondropoma acerbulum.**

Cyclostoma acerbulum, Morelet, Test. Noviss. ii. p. 19[1]; Pfr. Monogr. Pneum. Vivent. i. p. 420[2]; Gray, Cat. Phaneropn. p. 225[3].

Chondropoma acerbulum, Fischer & Crosse, Miss. Scient. Mex., Mollusca, ii. t. 41. fig. 4 (letterpress not yet published).

Hab. N. GUATEMALA: Vera Paz (*Morelet*[1 2 3]).

b. *Sculpture spiral and vertical.*

aa. *Shell conical; sculpture rather faint.*

7. **Chondropoma gruneri.**

Cyclostoma gruneri, Pfr. in Zeitschr. f. Malak. 1846, p. 47 [1]; Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, *Cyclostoma,* no. 73, p. 79, t. 10. figg. 28, 29 [2].

Cistula gruneri, Gray, List Cyclopn. p. 59 [3]; Pfr. Monogr. Pneum. Vivent. i. p. 264 [4]; Gray, Cat. Phaneropn. p. 185 [5].

Chondropoma gruneri, Reeve, Conch. Icon. xiv., *Chondropoma,* t. 9. fig. 68 (enlarged) [6].

Hab. HONDURAS [3 4 5 6] (*Gruner* [1 2]).

Remarkable for its broad conical form and close spiral striæ, crossed by faint and much more distant elevated vertical ridges.

8. **Chondropoma radiosum.**

Cyclostoma radiosum, Morelet, Test. Noviss. i. p. 22 [1]; Pfr. in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, *Cyclostoma,* no. 267, p. 275, t. 37. figg. 15, 16 [2].

Cistula radiosa, Pfr. Monogr. Pneum. Vivent. i. p. 263 [3]; Gray, Cat. Phaneropn. p. 184 [4]; Fischer & Crosse, Miss. Scient. Mex., Mollusca, ii. t. 42. figg. 1–3 [4] (letterpress not yet published).

Chondropoma radiosum, Reeve, Conch. Icon. xiv., *Chondropoma,* t. 9. fig. 69 (enlarged) [5].

Chondropoma ottonis, Tristr. P. Z. S. 1863, p. 412 (nec Pfr.) [6].

Hab. N. and E. GUATEMALA: Province of Peten [2 3 4], in rocky localities (*Morelet* [1]); Livingston, Bay of Honduras (*Stoll*); Vera Paz (*Salvin* [6]).

Somewhat similar to *C. ottonis,* Pfr., from Cuba; but of a more oblong form and wanting the peculiar extension of the outer peristome on the body of the last whorl, which distinguishes the Cuban species. The specific name has reference to the radiating dark brown pattern of the peristome. Tristram [6] also gives Dueñas as a locality, perhaps in error.

9. **Chondropoma sargi.**

Cistula sargi, Crosse & Fischer, in Journ. de Conch. xxxi. p. 103 (1843) [1]; Fischer & Crosse, Miss. Scient. Mex., Mollusca, ii. t. 42. figg. 4–6 [2] (letterpress not yet published).

Cistula trochlearis (Pfr.), var., Tristr. P. Z. S. 1861, p. 232, & 1863, p. 412 [3].

Hab. N. GUATEMALA: Coban (*Sarg* [1]), Vera Paz (*Salvin* [3]).

10. **Chondropoma küsteri.**

Cyclostoma küsteri, Pfr. P. Z. S. 1851, p. 249 [1]; Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, *Cyclostoma,* no. 316, p. 312, t. 41. figg. 9, 10 [2].

Cistula küsteri, Pfr. Monogr. Pneum. Vivent. i. p. 265 [3]; Gray, Cat. Phaneropn. p. 186 [4].

? *Cistula küsteri,* Fischer & Crosse, Miss. Scient. Mex., Mollusca, ii. t. 42. fig. 7 [5] (letterpress not yet published).

Chondropoma küsteri, Reeve, Conch. Icon. xiv., *Chondropoma,* t. 11. fig. 87 [6].

Hab. HONDURAS (*Dyson* [1 2 3 4 6]).

bb. *Shell conico-oblong, somewhat pupiform.*

11. Chondropoma largillierti.

Cyclostoma largillierti, Pfr. in Zeitschr. f. Malak. 1846, p. 46 [1]; Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, *Cyclostoma*, no. 125, p. 121, t. 14. figg. 26, 27 [2].

Choanopoma largillierti, Gray, List Cycloph. p. 51 [3].

Cistula largillierti, Pfr. Monogr. Pneum. Vivent. i. p. 273 [4]; Gray, Cat. Phaneropn. p. 192 [5]; Fischer & Crosse, Miss. Scient. Mex., Mollusca, ii. t. 42. figg. 10, 11 (letterpress not yet published) [6].

Chondropoma largillierti (Pfr.), Reeve, Conch. Icon. xiv., *Chondropoma*, t. 11. fig. 86 [7].

Var. major, latior, costulis verticalibus minus confertis, peristomate latiore.

Cyclostoma grateloupi, Pfr. P. Z. S. 1851, p. 246 [8]; Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, *Cyclostoma*, no. 309, p. 306, t. 40. figg. 28–31 [9].

Cistula grateloupi, Pfr. Monogr. Pneum. Vivent. i. p. 272 [10]; Gray, Cat. Phaneropn. p. 191 [11]; Strebel, Abhandl. Geb. Naturw. Ver. Hamb. vi. 1, p. 10, t. 1. fig. 4 [12]; Fischer & Crosse, Miss. Scient. Mex., Mollusca, ii. t. 42. figg. 8, 9 (letterpress not yet published) [13].

Chondropoma grateloupi, Reeve, Conch. Icon. xiv., *Chondropoma*, t. 11. fig. 84 [14].

Hab. YUCATAN [3 5 9 10 11 14] (*Largilliert* [1 2 4 7]; *mus. Cuming* [8]); Campeche, in the woods (*Dr. Berendt* [12]); Merida in Yucatan, copiously (*Höge*).

After examining a large number of specimens I feel convinced that the distinction between *C. largillierti* and *C. grateloupi* cannot be maintained, many examples being intermediate—in one character (size or sculpture or breadth of the aperture) agreeing better with Pfeiffer's description of the former, in others with the latter.

cc. *Shell elongate.*

12. Chondropoma vespertinum.

Cyclostoma vespertinum, Morelet, Test. Noviss. ii. p. 19 [1].

Chondropoma (?) *vespertinum*, Pfr. Monogr. Pneum. Vivent. i. p. 418 [2]; Gray, Cat. Phaneropn. p. 200 [3].

Chondropoma vespertinum, Fischer & Crosse, Miss. Scient. Mex., Mollusca, ii. t. 41. fig. 7 (with operculum) (letterpress not yet published).

Hab. S.E. MEXICO: ruins of Palenque, in the woods of the province of Chiapas [2 3] (*Morelet* [1]).

13. Chondropoma turritum.

Cyclostoma turritum, Pfr. P. Z. S. 1851, p. 248 [1]; Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, *Cyclostoma*, no. 313, p. 310, t. 41. figg. 1, 2 [2].

Chondropoma (?) *turritum*, Pfr. Monogr. Pneum. Vivent. i. p. 289 [3]; Gray, Cat. Phaneropn. p. 205 [4].

Chondropoma turritum, Reeve, Conch. Icon. xiv., *Chondropoma*, t. 7. fig. 52 [5].

Hab. Honduras (*Dyson* [1 2 3 4 5]).

Remarkable for its slender turreted form and neat coloration variegated with white and dark reddish-brown.

Doubtful Species of Cyclostomidæ.

Chondropoma truncatum.

Cyclostoma truncatum (Wiegm.), Rossm. Icon. vi. p. 49, t. 28. fig. 397 (1839) [1]; v. Mart. in Malak. Blätt. xiii. p. 5 (1865) [2].

Chondropoma truncatum, Pfr. Monogr. Pneum. Vivent. i. p. 293 [3]; Gray, Cat. Phaneropn. p. 208 [4].

Hab. Mexico [1 2 3 4] (*Deppe*).

The original specimen is lost. The author's description and figure agree rather well with *Chondropoma turritum*, Pfr.; but this has hitherto only been known from Honduras, and Deppe did not collect in that country, but in Mexico.

Tudora planospira.

Cyclostoma (*Tudora*) *planospira*, Pfr. in Malak. Blätt. iii. p. 208 (1856) [1].

Tudora planospira, Pfr. Monogr. Pneum. Vivent. ii. p. 127 [2].

Hab. "In republica Mexicana, *teste* Poey."

No other species of *Tudora* is known from the American continent. No figure is given.

DIPLOMMATINA.

Diplommatina, Benson, Ann. & Mag. Nat. Hist. iv. (2), p. 193 (1849).

Shell ovate, thin, with vertical riblets; whorls somewhat irregular, the one before the last the largest; aperture vertical, circular; peristome double, expanded. Operculum thin, shelly, paucispiral. Tentacles long, filiform; eyes bilobated, sessile at the hinder part of the base of the tentacles.

1. **Diplommatina stolli**, sp. n. (Tab. I. figg. 19 *a*, *b*.)

"Eine winzige Art, welche einen sonst blos aus Ostindien bekannten linksgewundenen starkgerippten Typus darstellt."—*O. Stoll*, Guatemala, Reisen und Schilderungen aus den jahren 1878–1883, p. 199 (1886).

Testa sinistrorsa, imperforata, ovato-conica, costulis in anfr. penultimo 16 sat validis, albida; anfr. 6, convexi, priores duo læves, flavescentes, penultimus maximus, ultimus paullo angustior, rotundatus, læviusculus; apertura subverticalis, circularis, peristomate continuo, incrassato, expanso, albo.

Long. $2\frac{1}{2}$, diam. 1, apert. $\frac{2}{3}$ millim.

Hab. N.W. GUATEMALA: in the district Cholhuitz, on the slope of the Volcan de Santa Maria, at the plantation Helvetia, on the ground, in the second-growth woods, two specimens (*O. Stoll*).

This strange genus was for a long time only known from the tropical parts of India and Polynesia. One American representative has, however, been recorded; this was found on the island of Trinidad by L. Guppy (*cf.* Am. Journ. Conch. iv. p. 178, and vi. p. 308), and referred by him to the Indian *D. huttoni*, Pfr. I have a specimen from Trinidad before me, and find that in *D. stolli* the riblets are very much stronger and less numerous.

Fam. HELICINIDÆ.

The shells of the Helicinidæ, as their name implies, resemble somewhat those of the well-known genus *Helix*; but they are easily to be distinguished from the great majority of the *Helices* by the central part of the lower face being filled up by a shelly callosity instead of being excavated into an umbilicus. Moreover, the presence of a shelly operculum (wanting only in *Proserpina*) and of but one pair of feelers, and the position of the eyes at the base (not on the tip) of them, widely separate the Helicinidæ from *Helix*, as also the internal structure, the individual distinction of the sexes, and the quality of the radula (Rhipidoglossata); as regards the radula, they agree only with the Neritinæ among all land and freshwater shells, and they seem therefore to belong to a peculiar series of Mollusca, ascending from marine life to a terrestrial one through *Trochus*, *Nerita*, *Neritina*, *Hydrocena*, and *Helicina*. The semicircular form of the aperture and of the operculum, and the want of spiral structure in the latter, serve to distinguish them from the families Cyclophoridæ and Cyclostomidæ (with the exception of the genus *Bourciera*, which does not come within the limits of this work).

The Helicinidæ are nearly circumtropical and prominently insular, being wanting only in the continent of Africa, but they are extremely scarce in the tropical regions of Asia, and here limited to the south-eastern sea-shores (China, Siam, Arakan); and they are represented in Europe, with the Azores and the Canary Islands, only by the peculiar and rare genus *Hydrocena*. The islands of the Pacific and those of the Caribbean Sea are their head-quarters; Cuba, for example, having eighty-three species, and Jamaica thirty-one. They extend, however, in North and in South America farther than the Cyclostomidæ; *Helicina orbiculata* is found alive in Georgia and Tennessee, and also postpleiocene in the Mississippi valley, and several species occur in Southern Brazil.

We know at present about forty species found within Mexico and Central America, including some which are doubtfully distinct. They are distributed over the whole area in the following manner:—

1. Central Mexico, N. of the tropic.
Helicina durangoana and *H. borealis.*

2. Central Mexico, between the tropic and the Isthmus of Tehuantepec.
Helicina ghiesbreghti and *H. tenuis.*

3. Western slope of Mexico, between the same limits.
Helicina punctisulcata, H. fragilis.

4. Eastern slope of Mexico, between the same limits, chiefly State of Vera Cruz.
Helicina cinctella, H. zephyrina (*turbinata*), *H. deppeana, H. cordilleræ, H. chrysocheila, H. tenuis, H. fragilis, H. succincta, H. delicatula, H. oweniana*, var., *H. notata, H. flavida, H. lirata, H. mohriana.*
Schasicheila nicoleti, S. pannucea, S. alata.
Proserpina eolina, P. salleana, P. berendti.

This large number is due chiefly to the circumstance that many collectors, and among them some very zealous and exact, have collected in this district for a considerable time.

5. South-eastern Mexico, Chiapas, Tabasco.
Helicina ghiesbreghti, H. tenuis, H. oweniana, H. florida, H. lirata.

6. Yucatan.
Helicina tenuis, H. arenicola.

7. British Honduras.
Helicina dysoni.

8. North-west Guatemala, Valley of the R. Usumacinta below Salinas.
Helicina amœna, H. tenuis, H. fragilis, H. oweniana, var., *H. flavida.*
Schasicheila pannucea.

9. North-east Guatemala, Valley of the R. Polochic and of the R. Usumacinta above Salinas.
Helicina amœna, ? *H. sowerbyana, H. rostrata, H. tenuis, H. fragilis, H. oweniana*, var., *H. flavida, H. chryseis, H. microdina.*
Schasicheila pannucea.

10. South Guatemala, Pacific slope.
Helicina ghiesbreghti, H. tenuis, H. lirata.
Schasicheila pannucea.

11. Honduras.

Helicina rhynchostoma, H. denticulata, H. sanguinea, H. dysoni, H. lirata, H. antoni, H. diaphana, H. exigua.

12. Salvador.

None recorded hitherto.

13. Western Nicaragua, Pacific slope.

None recorded hitherto.

14. Eastern Nicaragua, valley of the great lake and Caribbean slope.

Helicina amœna, H. rostrata, H. denticulata, H. tenuis, H. dysoni.

15. Costa Rica and the State of Panama, Pacific slope.

Helicina amœna, var.

16. Costa Rica, Caribbean slope.

? *Helicina funcki, H. tenuis, H. flavida*, var. *beatrix*, ? *H. lirata.*

The present state of our knowledge permits us to come to the following probable conclusions:—

The regions drained into the Caribbean Sea are much richer in species than those of the Pacific slope, not only because they are also much more extensive, but also because they are more favoured by a moist climate.

The more northern part of Mexico has few really peculiar species.

Several species extend along the Caribbean side, from the State of Vera Cruz to Guatemala (*Helicina fragilis, H. oweniana, Schasicheila pannucea*); some even to Nicaragua and Costa Rica (*Helicina amœna, H. tenuis, H. flavida, H. lirata*); *Helicina dysoni* from Belize to Nicaragua.

Helicina punctisulcata is peculiar to the Western slope of Central Mexico.

Helicina ghiesbreghti extends from Central Mexico (territory of the Laguna de Chapala) along the west coast (Chiapas?) to Guatemala, but does not seem to extend to the Caribbean side.

On the contrary, *Helicina amœna, H. tenuis, H. lirata*, and *Schasicheila pannucea* seem to be common both to the Caribbean and Pacific shores, chiefly within Guatemala.

Helicina rhynchostoma and *H. funcki* extend from Honduras and Costa Rica through the Isthmus of Panama to Colombia, *H. lirata* even from Vera Cruz to Venezuela. But no species is common to the continent of Mexico or Central America and the Caribbean islands (cf. *H. flavida*?).

The genus *Schasicheila* is limited to Eastern Mexico and Guatemala; *Proserpina*, on the contrary, is common to Eastern Mexico, the Caribbean islands, and Venezuela, and may therefore yet be found in the more southern parts of Central America.

Comparative Table of the Species of *Helicina*.

	Figura.	Color.	Sculptura.	Basis columellæ.	Peristoma.	Diam.	Alt.	Apert.	Patria.
amœna, *Pfr.*	trochiformis, obtuse angulata.	e luteo et roseo varius.	striis impressis spiralibus distantibus; subtilissime descendenti-lineolata.	subarcuata, tuberculo prominulo.	breviter expansum, album.	mm. 12 – 17	mm. 8½ – 11	mm. 7 – 8	(Yucatan), Guatemala, Honduras, Nicaragua, Chiriqui.
ghiesbreghti, *Pfr.*	depresse trochiformis, acute carinata.	flavidus, carina et sutura alba.	,,	subperpendicularis, tuberculo prominente.	reflexum, ad carinam dilatatum, album.	16 – 19	12	9	Central and S. Mexico, Guatemala.
rhynchostoma, *Pfr.*	trochiformi-lenticularis, distincte carinata.	rufo-fuscus, carina alba.	sublævis, striatula, exilissime descendenti-lineolata.	perpendicularis, obtuse angulata.	reflexum, album, *ad carinam productum.*	8	7	5	Honduras.
cinctella, *Shuttl.*.....	trochiformis, basi convexa, carinata.	albus vel flavescens, plerumque fusco-unifasciatus.	subtiliter spiratim lineata.	subarcuata, non prominens, impressione lineari.	breviter reflexum, album.	11 – 13	8½ – 9	5 – 5½	E. Mexico.
——, var. botteriana, *Pfr.*	,,	sulfureus.	,,	,,	callo vitellino.	14	9		E. Mexico.
rostrata, *Morel.*	conoideo-globosa.	albus, fusco-bifasciatus.	sublævis, subtilissime spiratim lineolata.	arcuata.	brevissime expansum, *extus mucronatum.*	13½ – 16	10 – 12	6 – 7	Guatemala, Nicaragua.
denticulata, *Pfr.*	globoso-conica.	albus, flavo-fasciatus.	rugis antrorsum descendentibus rarioribus; *sutura denticulata.*	arcuata, "dentata."	album, paullum expansum, extus mucronatum.	13	9	7	Honduras, Nicaragua.
zephyrina, *Duclos* ..... turbinata, *Wiegm.*	conico-globosa, angulo evanescente.	albidus, fascia lata rufa.	subtiliter spiratim lineata.	subarcuata, obtuse prominula.	modice expansum, album.	13 – 16	11 – 13½	6 – 8	E. Mexico.
berendti, *Pfr.*.....	conico-globosa, subangulata, supra angulum excavata?	albidus?	,,	arcuata.	expansum.	12½	11	6	E. Mexico.
——, var. minima, *Streb.*.	,,	,,	,,	,,	,,	10	8–9	5½	E. Mexico.
deppeana, *v. Mart.*.....	subdepresse conoidea, obtuse subangulata.	subcarneus unicolor vel albido-aspersus.	vix conspicue spiratim lineolata.	subperpendicularis, brevissima, tuberculo prominente.	incrassatum vix expansum, album.	14 – 14½	11 – 12	7 – 8	E. Mexico.
cordilleræ, *Pfr.*	depresse globoso-conica, rotundata.	albidus, rubro plurifasciatus.	"striatula."	in nodulum terminata.	incrassatum, expansum.	12½ 11½	10 9	7 6	E. Mexico.
funcki, *Pfr.*.....	conico-subglobosa, obsolete angulata.	flavidus, roseo-nebulosus.	subtilissime oblique striatula.	subarcuata, lineari-impressa, subnodosa.	late expansum, superne subrepandum.	13½ – 15	10 – 12	8½	Costa Rica (Colombia).

sowerbyana, *Pfr.*	depresse trochiformis, subcarinata.	albus.	spiratim sulcata.	nodifera.	expansum, superne sinuatum.	21	15	11	Guatemala.
sinuosa, *Pfr.*	globoso-conica, subcarinata.	,,	spiratim tenuiter striata.	nodo dentiformi.	expansum, superne sinuatum, tuberculo parietali.	16	13	8	Mexico?
tenuis, Pfr.....	elate conico-globosa.	corneo-albidus rubro trifasciatus, var. unifasciatus.	"vix striatula."	"basi retrorsum subdentata."	expansum, album.	10 | 11	10	6	Yucatan.
——, var. vernalis, *Morel.*	conico-globosa, obtuse subangulata, tenuis.	virenti-flavidus vel pallide carneus, unicolor vel anguste bifasciatus vel albo-adspersus.	subtilissime rugulosa vel malleolata, sublævis, nitida.	arcuata, prominentia dentiformi munita.	,,	$8\frac{1}{2}$ | 12	$7\frac{1}{2}$ | 12	5 | $6\frac{1}{2}$	Guatemala, E. Mexico, Tabasco.
——, var. chiapensis, *Pfr.*	globoso - turbinata, tenuis.	rubello-corneus obsolete fasciatus.	striatula, malleolata.	antrorsum in denticulum desinens.	late expansum, album.	12	9		Chiapas.
——, var. lindeni, *Pfr.* ...	globoso conica, tenuiuscula.	pallide stramineus vel carneus.	subtilissime striolata et punctata.	,,	breviter expansum, album.	$11\frac{1}{2}$	$9\frac{1}{2}$	6	Mexico.
fragilis, *Morel*.....	conoideo-globosa, tenuis.	rubellus vel lutescens.	minutissime striatula.	angulo prominulo.	incrassatum, reflexiusculum.	$5\frac{1}{2}$	6		N. Guatemala.
——, var. elata, *Shuttl.*...	,,	carnescenti-albidus.	,,	,,	,,	$4\frac{1}{2}$	5	$2\frac{1}{2}$	E. Mexico, W. Mexico.
——, var. merdigera, *Sallé*	turbinata.	rubicundus vel hyalinus luto indutus.	irregulariter striata.	basi subdentata.	breviter expansum.	6	$4\frac{1}{2}$		E. Mexico.
notata, *Pfr*.....	globoso-turbinata.	pallide flavus, macula sanguinea in anfr. penultimo.	obsolete spiratim lirata et malleolata.	vix tuberculata, non prominens.	incrassatum, breve reflexum.	$7\frac{1}{2}$ | $8\frac{1}{2}$	7 | 8	4 | $4\frac{1}{2}$	E. Mexico.
succincta, *v. Mart.*.....	conico-globosa.	carneus vel stramineus.	liris subdistantibus levibus circumdata.	tuberculata, callo crasso circumscripto.	calloso-incrassatum, expansum.	10 | 8	$8\frac{1}{2}$ | $6\frac{1}{2}$	5	E. Mexico.
raresulcata, *Pfr*.....	globoso-conica, subtrochiformis, rotundata.	carneo- vel lutescenti-albidus.	sulcis spiralibus distantibus.	extrorsum denticulata.	breviter expansum.	$5\frac{1}{2}$ | $6\frac{3}{4}$	$4\frac{3}{4}$ | $5\frac{3}{4}$	3 | $3\frac{1}{3}$	E. Mexico.
diaphana, *Pfr.*	subconoideo - depressa, apice tenuis obtusa, obsolete subangulata.	fulvo-lutescens, nitidulus.	oblique striatula.	subnodosa, callo circumscripto.	,,	5	$3\frac{1}{3}$		Honduras.

Comparative Table of the Species of *Helicina* (*continued*).

	Figura.	Color.	Sculptura.	Basis columellæ.	Peristoma.	Diam.	Alt.	Apert.	Patria.
durangoana, *Mouss.*	depresse conoidea, angulata.	albidus, opacus.	subtiliter spiratim striata.	subperpendicularis, tuberculo obtuso.	breviter expansum.	mm. 8½ | 10	mm. 6½ | 8½	mm. 4½ | 5	N. Mexico.
borealis, *v. Mart.*	depressa, apice prominulo, rotundata.	obsolete maculosus.	striatula.	brevissima rectangula, callo crasso circumscripto.	incrassatum, vix expansum.	11½	7½	5	N. Mexico.
oweniana, *Pfr.*	conico-globosa.	albidus vel straminеus, nitidus, sutura alba.	subtilissime oblique et spiratim striatula.	brevis arcuata, angulo obsoleto.	vix expansum, subangustum, aurantiacum.	8 | 9	7 | 8½	4 | 4½	Chiapas, Guat mala.
——, var. anozona, *v. Mart.*	globosa.	carneo - flavescens, zona suturali alba vel pallide flava.	„	„	incrassatum, luteum.	8 | 7½	7 | 6½	5 | vix 4	Guatemala.
——, var. coccinostoma, *Morel.*	conico-globosa.	albus, citrinus, vel fulvus.	?	angularis.	sub-bilabiatum, coccineum, reflexum.	9			Guatemala.
sanguinea, *Pfr.*	conoideo-depressa, orbiculata, subangulata.	sanguineus.	punctato-striatula.	antrorsum dentata.	rectum, sublabiatum.	10½	6½	5½	Honduras.
delicatula, *Shuttl.* (heloisæ, *Sallé*)	conoideo-globosa.	luteus, plerumque fusco unifasciatus, sutura pallida.	subtilissime spiratim et oblique lineolata, nitida.	brevis, arcuata, inermis.	expansum, tenuiusculum.	8 | 11	6½ | 9	5½ | 5½	E. Mexico.
arenicola, *Morel*.....	depresse conoidea.	albido - flavescens, maculis corneo-pellucidis obsoletis.	spiratim striata.	tuberculata, callo crasso circumscripto.	incrassatum, breviter reflexum.	7			Yucatan.
antoni, *Pfr.* (an juv.?) ...	globoso-conica, obsolete angulata.	lutescenti-carneus, variegatus.	leviter rugulosa.	breviter recedens, angulo subrecto.	tenue, expansiusculum.	3	2	1¼	Honduras.
punctisulcata, *v. Mart.* ...	conoidea, subangulata.	rufescens, spira rufa: sæpius fasciatus: callo flavo.	sulcis distantibus punctiferis.	subangulata.	leviter expansum.	9	7½	4½	W. Mexico.
flavida, *Menke*	rotundato-conica, basi subplanulata.	pallide luteus vel albidus vel rubescens, sæpius apice rubro, interdum fasciatus.	spiratim striatula, nitida.	arcuata, inermis.	breviter expansum, album.	5⅔ | 6	5⅓ | 6	3	E. Mexico, Tabasco, Guatemala.

——, var. beatrix, *Angas*.	elate conoidea.	viridulus, sutura alba.	,,	,,	,,	5	$4\frac{2}{3}$		E. Mexico.
——, var. strebeli, *Pfr.*...	conoideo-globosa.	flavo-carneus.	,,	,,	,,	5	$4\frac{1}{2}$–$4\frac{3}{4}$	$2\frac{1}{3}$	E. Mexico.
——, var. brevilabris, *Pfr.*	globoso-turbinata.	fulvidus.	,,	,,	breviter expansum.	7	5		Chiapas.
mohriana, *Pfr.*	conico - rotundata, basi excavata.	corneo-lutescens.	nitida, tenuis, obsoletissime striatula.	brevis.	vix expansiusculum, tenue, simplex.	5	$4\frac{1}{2}$		E. Mexico.
chrysocheila, *Binn.*	conico - globosa, tenuis (subangulata ?).	flavus.	nitida, subtilissime punctulata.	arcuata, inermis.	expansum, aurantiacum, callo aurantiaco.	10	8		S.E. United States, N.E. Mexico.
——, var. shuttleworthi, *v. Mart.*	depresse subgloboso-conica, solidula, basi planulata.	flavescenti-albidus.	spir. et oblique subtilissime striatula.	simplex.	calloso-incrassatum, expansum, aurantiacum.	9	$6\frac{1}{2}$		E. Mexico.
exigua, *Pfr.* (juv. ?)	conica, spira obtusiuscula, obsolete angulata, tenuis.	pallide corneus, pellucidus.	subtilissime punctato-striatula.	brevis.	simplex, tenue.	$2\frac{1}{2}$	2		Honduras.
chryseis, *Tristr.*	elate acute trochiformis, angulata.	flavus.	subgranulata, solidula.	arcuata.	expansum, albo limbatum.	3	$3\frac{1}{2}$	$1\frac{1}{2}$	Guatemala.
dysoni, *Pfr*.....	orbiculato - conoidea, spira elata, obtusiuscula.	carneus, fasciis 2 angustis.	striatula.	subtruncata, callo albido circumscripto.	brevissime reflexiusculum.	8 | 6	6 | $4\frac{1}{2}$	4	(Venezuela), Honduras.
——, var. jansoni, *v. Mart.*	distincte angulata.	,,	,,	,,	,,	5	4	2	Honduras.
——, var. bocourti, *Cr. & Fisch.*	subglobuloso - conoidea, subangulata.	albidus, fasciis 2 rubro-fuscis.	obsolete striatula, nitidula.	angulata.	,,	6–7 | 5	5 | 4	3 | 2	British Honduras.
microdina, *Morel.* (juv. ?).	conica, angulata.	flavus, sursum saturatior.	spiratim lirata.	arcuata.	simplex, rectum.	4	4		Guatemala.
lirata, *Pfr.*	depressa, spira conoidea, carinata, basi impressa.	rubicundus.	spiratim acute et conferte lirata.	brevissima, simplex.	breviter expansum, dente infero obsoleto.	4 | 3	$2\frac{2}{3}$ | 2	2 | $\frac{1}{2}$	Mexico, Yucatan, Guatemala, Venezuela.
——, var. rusticella, *Morel.*	depressa, spira conoidea, non angulata.	corneo-rubellus.	,,	,,	,,	4–5			Yucatan.
——, var. unidentata, *Pfr.*	depressa, spira vix elevata, rotundata, basi profunde excavata.	rubellus, nitidulus.	spiratim lirata, liris alternatim validioribus.	simplex.	expansum, albo-labiatum, dente infero valido.	4 | 5	$2\frac{1}{2}$	2	Honduras.
——, var. semistriata, *Sow.*	,,	,,	spiratim lirata, subtus lævis.	,,	,,	,,	,,	,,	Panama.

HELICINA.

Helicina, Lamarck, Prodr. p. 76 (1779).

I. *Carinatæ*.

1. **Helicina ghiesbreghti.**

Helicina ghiesbreghti, Pfr. P. Z. S. 1856, p. 381 [1]; Monogr. Pneum. Vivent. ii. p. 215 [2]; Sow. Thes. Conch. iii. p. 293, t. 277. fig. 432 [3].

Helicina ghiesbrighti, Reeve, Conch. Icon. xix., *Helicina*, t. 27. fig. 242 [4].

Hab. C. Mexico: Irapuato, near Guanajuato (*Höge*).

S. Mexico: Chiapas [3 4] (*Ghiesbreght* [1 2]).

S. Guatemala: El Reposo 8000 feet (*Champion*); San Francisco Miramar, Costa Cuca, Pacific slope, 2500 feet (*Stoll*).

2. **Helicina amœna.**

Helicina amœna, Pfr. P. Z. S. 1845, p. 119 [1]; Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, *Helicina*, no. 73, p. 55, t. 8. figg. 13–15 [2]; Monogr. Pneum. Vivent. i. p. 386 [3]; Gray, Cat. Phaneropn. p. 281 [4]; Tristr. P. Z. S. 1861, p. 233 [5]; Sow. Thes. Conch. iii. p. 292, t. 276. fig. 383 [6]; v. Mart. P. Z. S. 1875, p. 649 [7]; Reeve, Conch. Icon. xix., *Helicina*, t. 20. fig. 177 [8].

Helicina purpureo-flava, Morelet, Test. Noviss. i. p. 19 (1849) [9].

Hab. Yucatan: Campeche (*coll. Albers, ex mus. Heidelbergensi*).

N. Guatemala: Provinces of Peten and Vera Paz (*Morelet* [3 4 9]); Coban, Vera Paz (*Salvin* [5 7]); San Juan, Sabo 2800 feet, Chacoj, and Panzos, all in the valley of the Polochic River (*Champion*); Teleman in the same valley, ascending plants (*Stoll*).

Honduras [2 3 4] (*mus. Cuming* [1]), Honduras Bay [6 8].

Var. a: minor (diam. 12, alt. $8\frac{1}{2}$ millim.), pallide flava.

Hab. Nicaragua (*Janson*).

Var. b: depressa (diam. 13, alt. $7\frac{1}{2}$ millim.).

Hab. S. Panama: Bugaba, W. of David (*Champion*).

Somewhat variable in colour; the rose-colour often prevails on the upper whorls, but is absent in several examples. The obtuse keel is often white; in other specimens of the same colour as the rest of the last whorl. Young examples are sometimes covered by a dirty coat of apparently foreign matter.

3. **Helicina sowerbyana.**

Helicina sowerbiana, Pfr. P. Z. S. 1848, p. 124 [1].

Helicina sowerbyana, Pfr. in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, *Helicina*, no. 65, p. 50,

t. 6. figg. 9, 10 [2]; Monogr. Pneum. Vivent. i. p. 385 [3]; Gray, Cat. Phaneropn. p. 280 [4]; Sow. Thes. Conch. iii. p. 292, t. 277. fig. 418 [5]; Reeve, Conch. Icon. xix., *Helicina*, t. 23. fig. 202 [6].

Hab. GUATEMALA [5] (*de Lattre* [1 2 3 4]). Not found by the later explorers.

Very near the preceding, but larger and less angulated.

N.B.—A variety of *Helicina concentrica* (depressed, trochiform, spirally ridged above, sharply keeled) is quoted by Pfeiffer (P. Z. S. 1848, p. 120, and Monogr. Pneum. Vivent. i. p. 400) as found near Mirador in Mexico by Galeotti; but as nobody else (neither Berendt and Strebel nor Höge) has found it in the province of Vera Cruz, or elsewhere in Mexico, I think it better not to admit this species among the Mexican ones. It is common in Venezuela. Mr. E. Smith has examined the specimen marked "Mirador" in the British Museum, and states that it is not the original to the figures 18, 19, t. 8, of *Helicina* in Martini and Chemnitz, Syst. Conch.-Cab. ed. 2.

4. Helicina cinctella.

Helicina cinctelta, Shuttl. in Bern. Mittheil. 1852, p. 304 (Diagn. no. 3 [1], p. 44); Pfr. Monogr. Pneum. Vivent. ii. p. 215 [2]; Strebel, Abhandl. Geb. Naturw. Ver. Hamb. vi. 1, p. 21, t. 1 *a*, and t. 2. figg. 13, *a–d* [3]; Sow. Thes. Conch. iii. p. 293, t. 276. figg. 389, 390 [4].

Helicina cinctilla, Reeve, Conch. Icon. xix., *Helicina*, t. 21. fig. 182 [5].

Helicina botteriana, Pfr. in Malak. Blätt. xiii. p. 90 (1866) [6]; Monogr. Pneum. Vivent. iv. p. 279 [7].

Hab. E. MEXICO: Cordova [4 5], Vera Cruz (*Jacot-Guillarmod*, *Sallé*, *Höge*); Cerro de Plumas near Cordova (*Höge*); Mirador (*Strebel* [3]); Orizaba [7] (*Strebel* [3], *Botteri* [6]).
N.W. MEXICO, Tepic, State of Jalisco (*W. B. Richardson*).

Very variable in the relative height of the shell. Usually white, with a pale brown band above the keel; but in some examples this band disappears, and in others is extended on nearly the whole upper half of the last whorl.

H. botteriana, Pfr., is, according to the specimens in his collection, not even a variety, but coincides fully with *H. cinctella*.

5. Helicina rhynchostoma.

Helicina rhynchostoma (Shuttl.), Pfr. Monogr. Pneum. Vivent. iii. p. 245 [1]; Sow. Thes. Conch. iii. p. 294, t. 277. figg. 429, 430 [2].

Helicina rhyncostoma, Reeve, Conch. Icon. xix., *Helicina*, t. 27. fig. 240 [3].

Hab. HONDURAS: Island of Bonacca, bay of Honduras (*Gaumer*).
COLOMBIA, Campanera 3000 feet [1].
VENEZUELA [2 3].

This species, in its beaked peristome, approaches the following group.

II. *Rostratæ.*

6. **Helicina rostrata.**

Helicina rostrata, Morelet, Test. Noviss. ii. p. 17 (1851)[1]; Pfr. Monogr. Pneum. Vivent. i. p. 361[2]; Gray, Cat. Phaneropn. p. 261[3]; Sow. Thes. Conch. iii. p. 288, t. 273. figg. 279, 280[4]; Reeve, Conch. Icon. xix., *Helicina,* t. 18. fig. 155[5]; Tate, in Am. Journ. Conch. v. p. 159 (1870)[6]; Mart. P. Z. S. 1875, p. 649[7].

Helicina salvini, Trist. P. Z. S. 1861, p. 233, t. 26. figg. 9, 10[8]; Pfr. Novit. Conch. i. p. 202, t. 53. figg. 12–15[9]; Malak. Blätt. viii. p. 174 (1862)[10]; Monogr. Pneum. Vivent. iii. p. 245[11].

Hab. N. Guatemala: San Agustin Lanquin in Vera Paz[3]*, in rocky localities (*Morelet*[1 2]); Vera Paz[4 5]; Coban (*Salvin*[7]); Guatemala[8 9 10 11].

Centr. Nicaragua: San Diego, in the savana region (*Tate*[6]); Acoyapa (*Belt*).

The specimen from the last-named locality is somewhat smaller (diam. 12, alt. 10 millim.) than those from Guatemala.

7. **Helicina denticulata.**

Helicina denticulata, Pfr. P. Z. S. 1855, p. 103[1]; Novit. Conch. i. p. 84, t. 23. figg. 9, 10[2]; Monogr. Pneum. Vivent. ii. p. 208[3]; Sow. Thes. Conch. iii. p. 288, t. 273. fig. 281[4]; Tate, in Am. Journ. Conch. v. p. 159 (1870)[5]; Reeve, Conch. Icon. xix., *Helicina,* t. 18. fig. 157[6].

Hab. Honduras[1 3 4 5 6].

E. Nicaragua: Forests of Chontales, rare, ascending trees (*Tate*[5]).

Chiefly distinguished from *H. rostrata* by the denticulate suture.

III. *Turbinatæ.*

8. **Helicina zephyrina.**

Helicina turbinata (Wiegm.), Menke, Synops. Moll. p. 39 (1830) (without description)[1]; v. Mart. in Malak. Blätt. xii. pp. 6–9 (1865)[2]; Sow. Thes. Conch. iii. p. 288, t. 273. figg. 276–278[3]; Reeve, Conch. Icon. xix., *Helicina,* t. 8. fig. 63[4]; Strebel, Abhandl. Geb. Naturw. Ver. Hamb. vi. 1, p. 13, t. 1 *a* & t. 2. fig. 6[5].

Helicina turbinata, var. 2, Pfr. in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, *Helicina,* no. 46, p. 40, t. 9. fig. 31[6].

Helicina zephyrina, Duclos, in Guérin's Mag. Zool. 1833, t. 21[7] (copied in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, *Helicina,* no. 43, p. 37, t. 4. figg. 16–18)[8]; Sow. Thes. Conch. i. p. 9, figg. 25, 27[9], & iii. p. 288, t. 273. figg. 266–269[10] (non Reeve, Conch. Icon. xix., *Helicina,* t. 17. fig. 149); Gray, Cat. Phaneropn. p. 268[11].

* This locality is quoted as "San Agostino" by authors: it is, no doubt, the San Agustin Lanquin near Cahabon.

Hab. E. Mexico: Mexico [3 4 7 8 11 16 17]; Tampico (*Hegewisch* and *Liebmann* [6]); Jalapa (type of *H. turbinata*: *Deppe & Schiede* [2]; also *Höge*, *M. Trujillo*, and *F. D. Godman*); Mirador, State of Vera Cruz, on shrubs and bushes, plentiful (*Strebel* [18]); Cordova (*Höge*); Tejeria, only young specimens (*Höge*); Huatusco (*Hille, coll. Dunker*).

Var. a: elatior.

Helicina zephyrina (Duclos), Sow. Thes. Conch. i. fig. 118 [12]; v. Mart. in Malak. Blätt. xii. pp. 7, 8 [13].

Helicina turbinata, Pfr. in Zeitschr. f. Malak. 1848, p. 87 [14]; Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, *Helicina*, no. 46, p. 39, t. 4. figg. 13–15, t. 7. fig. 6 [15]; Monogr. Pneum. Vivent. i. p. 370 [16]; Gray, Cat. Phaneropn. p. 268 [17]; Strebel, Abhandl. Geb. Naturw. Ver. Hamb. vi. 1, p. 13, t. 1 *a*. figg. 6 *b*, *e*, *f* [18].

Hab. E. Mexico: Papantla (*Deppe & Schiede*); Misantla and Mirador (*Strebel* [18]); Rio de Misantla (*F. D. Godman*); Cordova, with the preceding (*Höge*).

Var. b: excavato-angulata.

Helicina behrendti, Pfr. in Malak. Blätt. viii. p. 173, t. 3. figg. 14, 15 (1862) [19].

Helicina berendti, Pfr. Monogr. Pneum. Vivent. iii. p. 230 [20].

Hab. E. Mexico: Vera Cruz [20] (*Berendt* [19]).

Var. c: minima (diam. 10, alt. 8–9 millim.).

Helicina turbinata, var. *minima*, Strebel, loc. cit. pp. 14, 15, t. 1 *a*. fig. 6 *d* [21].

Hab. E. Mexico: Vera Cruz, on bushes and shrubs—probably stunted by the aridity of the soil (*Strebel* [21]).

The prevailing pattern of all the forms is a large pale reddish-brown band on the upper half of the last whorl; a row of small dark spots at the lower limit of this band is often seen on the upper whorls, and in some specimens also on the last, the band itself vanishing in proportion as these spots are conspicuous. Specimens without any band, of a uniform whitish or pale reddish colour, are found chiefly in the variety *a*.

The original specimen of Pfeiffer's *H. berendti* exhibits no trace of irregularity and deformity, and it is therefore to be regarded as a distinct variety, characterized by the concavity and angularity of the last two whorls. Its exact locality is not known: probably it was established on a bleached specimen found on the sea-shore at Vera Cruz.

H. sandozi, Shuttl. (in Bern. Mittheil. 1852, p. 303, Diagn. no. 3, p. 43, and Pfr. Monogr. Pneum. Vivent. ii. p. 197), is a deformity of this species. Owing to the kindness of Prof. Th. Studer, I have been enabled to examine the original example in the late Mr. Shuttleworth's collection; it proves to have been broken during life just behind the aperture, and to have restored itself, the newly formed peristome not meeting exactly the remains of the old near the columella, the slight inflection

which exists here * in every adult specimen of this species being thus enlarged to a distinct notch; also the projection of the lower end of the columella is somewhat stronger than in normal specimens, perhaps increased by new secretion during the restoring process. Surely it is neither an *Alcadia*, nor belongs to *H. tenuis*.

H. turbinata is also quoted by Tate (Am. Journ. Conch. v. p. 159) as found in Nicaragua at Toro Rapids: I suppose this is an erroneous determination, as this Mexican species has never been found even in Guatemala, which has been explored by so many collectors; perhaps it was the common *H. tenuis* (*vernalis*).

9. **Helicina sinuosa.**

Helicina sinuosa, Pfr. in Zeitschr. f. Malak. 1850, p. 191 [1]; Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, *Helicina*, no. 94, p. 70, t. 10. figg. 7, 8 [2]; Monogr. Pneum. Vivent. i. p. 369 [3]; Gray, Cat. Phaneropn. p. 267 [4].

Hab. Mexico [3 4] (*coll. Cuming* [1 2]).

Not again found; perhaps only an aberrant variety of the preceding.

10. **Helicina deppeana.** (Tab. I. figg. 7; 8, var.)

Helicina turbinata, var., Pfr. in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, *Helicina*, no. 46, p. 40, t. 8. figg. 1, 2 [1].

Helicina deppeana, v. Mart. in Monatsb. d. Berl. Akad. Novemb. 1863, p. 540 [2]; Malak. Blätt. xii. p. 6, t. 1. figg. 11, 12 (1865) [3]; Pfr. Monogr. Vivent. iii. p. 229 [4].

Helicina cordilleræ (part.), Sow. Thes. Conch. iii. t. 273. fig. 270 [5].

Hab. E. Mexico: Mexico [5], without nearer indication (*Deppe* [2 3 4]); Jalapa (*M. Trujillo*); Soledad (*Höge*); Yalalag, south of Villa Alta, State of Oaxaca (*Höge*).

Distinct from *H. zephyrina* by its broader, conical, subangulate form, and the somewhat more prominent basal tubercle of the columella, by which the adjoining part of the lower edge of the aperture appears slightly notched. The typical specimens collected by Deppe are unicolorous, somewhat worn (fig. 7 *b*); fresh ones from Yalalag are pale rose-colour, with white, more or less reticulated, lines and two rows of somewhat darker spots, one below the suture, and one above the angle of the last whorl (fig. 8).

11. **Helicina cordilleræ.**

Helicina cordilleræ (Sallé), Pfr. in P. Z. S. 1856, p. 323 [1]; Monogr. Pneum. Vivent. ii. p. 193 [2]; Sow. Thes. Conch. iii. p. 288, t. 272. figg. 264, 265 (not t. 273. fig. 270) [3]; Reeve, Conch. Icon. xix., *Helicina*, t. 16. fig. 143 [4] & t. 17. fig. 149.

* Sowerby, Thes. Conch. iii. t. 268. fig. 96, and Reeve, Conch. Icon. xix., *Helicina*, t. 3. fig. 20, represent, under the name of *H. sinuosa*, a distinct angulate shell with coarser sculpture, which is perhaps a similar deformity of another species.

Hab. E. Mexico: on the volcano Orizaba 12,000 feet above the sea* (*Sallé* [1 2]); Mexico [3 4].

12. **Helicina funcki.**

Helicina funcki, Pfr. in P. Z. S. 1848, p. 121 [1]; Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, *Helicina*, no. 37, p. 33, t. 9. figg. 1, 2 [2]; Monogr. Pneum. Vivent. i. p. 361 [3]; Sow. Thes. Conch. iii. t. 273. fig. 27 [4]; Reeve, Conch. Icon. xix., *Helicina*, t. 17. fig. 152 [5].

Helicina funki (sic), Angas, P. Z. S. 1879, p. 484, t. 40. fig. 7 (living animal) [6].

Helicina tuncki (sic), Gray, Cat. Phaneropn. p. 261 [7]; H. & A. Adams, Gen. Conch. ii. p. 302 [8].

Hab. E. Costa Rica: Talamanca, all the coast region and to the lower hills (*Gabb* [6]); Costa Rica (*Carmiol*); Cache (*Rogers*).

Colombia [4 5 7], Santiago (*Funck* [2 3], *in coll. Cuming* [1]).

Variable in size. Gabb's specimens are much larger than the type: according to the figure they are 18 millim. in diam., Pfeiffer's original one being 13½ millim.; Rogers's examples are 13–14, Carmiol's scarcely 13 millim. Gabb's specimens vary in colour from straw-yellow to orange; those collected by Rogers have the upper half of the last whorl reddish, with fine reticulated white lines, and the lower half yellow, the preceding whorls being either reddish or yellow. In general size and aspect this species resembles *H. zephyrina*; but differs from it in its peristome being narrow and more straight above, and rapidly increasing in width towards the periphery of the whole shell.

13. **Helicina chrysocheila.**

Helicina chrysocheila, Binney, Terr. air-breath. Moll. of the United States, ii. p. 354, t. 74. fig. 4 (1851) [1]; Tryon, in Am. Journ. Conch. iv. p. 13, t. 18. fig. 24 (1869) [2]; Binney, Land and Freshwater Shells of N. Am. pt. 3 (Smithson. Miscell. Coll. vii. no. 144), p. 110 (with woodcut) (1865) [3]; Terr. air-breath. Moll. of N. Am. v. in Bull. Mus. Comp. Zool. Harv. Coll. iv. t. 74. fig. 4 (as above) (1878); Pfr. Monogr. Pneum. Vivent. ii. p. 197 [4]; Reeve, Conch. Icon. xix., *Helicina*, t. 33. fig. 294 [5].

Hab. S.E. United States: Texas [2 3 5].

N.E. Mexico: Tamaulipas (*Couch*); Tampico [3]; Mexico [2 5].

Var. n. *shuttleworthi*. (*H. chrysocheila*, Tab. I. fig. 13.)

Helicina chrysocheila, Shuttl. in Bern. Mittheil. 1852, p. 303 (Diagn. no. 3. p. 43) [6]; Pfr. Monogr. Pneum. Vivent. ii. p. 203 [7].

Hab. E. Mexico, Cordova (*Jacot-Guillarmod* [6 7]).

Pfeiffer regards *H. chrysocheila*, Binney, as without doubt distinct from *H. chrysocheila*, Shuttl.; the latter was published a year later, and the coincidence of the names may be fortuitous. But on comparing Binney's descriptions and figures with Shuttle-

* The height of this mountain exceeds 16,000 feet.

worth's original specimen, there are very few differences: chiefly the more elevated figure of the former [diam. 10, height 8 millim., Binney (1865); diam. 9, height 6½ millim. according to Shuttleworth—Binney's figure, t. 74. fig. 4, is, therefore, somewhat magnified]. I have never seen Binneyan specimens.

Binney [1] and Pfeiffer [4] give "United States (?)" as the locality.

14. **Helicina tenuis.**

Helicina ambeliana, Sow. Thes. Conch. i. t. 1. fig. 19 (and fig. 26?) (nec Boissy) [1].

Helicina tenuis, Pfr. in P. Z. S. 1848, p. 124 [2] [nec C. B. Adams, Contribut. to Conchol. i. p. 14 (1840) *]; Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, *Helicina*, no. 47, p. 40, t. 7. figg. 33, 34 [3]; Monogr. Pneum. Vivent. i. p. 372 [4]; Gray, Cat. Phaneropn. p. 269 [5].

Var. *Helicina vernalis*, Morelet, Test. Noviss. i. p. 20 (1849) [6]; Pfr. Monogr. Pneum. Vivent. i. p. 372 [7]; Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, *Helicina*, no. 96, p. 71, t. 10. figg. 12–14 [8]; Gray, Cat. Phaneropn. p. 269 [9]; Sow. Thes. Conch. iii. p. 288, t. 273. fig. 273 [10]; v. Mart. P. Z. S. 1875, p. 649 [11].

Var. *Helicina chiapensis*, Pfr. in P. Z. S. 1856, p. 380 [12]; Monogr. Pneum. Vivent. ii. p. 198 [13]; Sow. Thes. Conch. iii. p. 288, t. 272. figg. 255, 256 [14].

Helicina chiappensis (sic), Reeve, Conch. Icon. xix., *Helicina*, t. 13. fig. 110 [15].

Var. *Helicina lindeni*, Pfr. in P. Z. S. 1848, p. 123 [16]; Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, *Helicina*, no. 67, p. 52, t. 8. figg. 25, 26 (not good) [17]; Monogr. Pneum. Vivent. i. p. 388 [18]; Gray, Cat. Phaneropn. p. 282 [19]; Sow. Thes. Conch. iii. t. 272. figg. 258–260 (not t. 273. fig. 270, nor t. 278. fig. 409, nor the description) [20]; Tristr. P. Z. S. 1861, p. 233 [21]; Reeve, Conch. Icon. xix., *Helicina*, t. 13. fig. 112 [22]; Angas, P. Z. S. 1879, p. 484 [23].

Hab. CENTRAL MEXICO: Sayula in Jalisco, Irapuato near Guanajuato (*Höge*).

E. MEXICO: Soledad, between Cordova and Orizaba (banded specimens) (*Höge*); Mexico, without nearer indication of locality [5 14 15 20 22] (*H. tenuis*, var. β; *Pfeiffer* [4]).

S.E. MEXICO: Chiapas (*Ghiesbreght* [12 13]) (normal and variegated specimens); Teapa and San Juan Bautista in Tabasco (*Höge*, *H. H. Smith*); Tapinapa (*Linden* [16 18 19]).

YUCATAN [4 5] (*coll. Cuming* [2]).

N. GUATEMALA: Province of Peten [7 8 9], in the woods (*Morelet* [6]); dense forests of Cubilguitz, valley of the River de la Pasion (*Champion*); Coban (*Salvin* [11]); San Gerónimo and the neighbouring mountains in Vera Paz (*Salvin* [21]); Panzos, Chacoj, and San Juan, all in the valley of the Polochic River, Purula (*Champion*); Guatemala [10].

S. GUATEMALA: Totonicapam Mountains 8500 to 10,500 feet (small variety); El Reposo 800 feet, Las Mercedes 3000 feet, Cerro Zunil 4000 feet, San Isidro 1600 feet, all on the Pacific slope; Zapote, on the slope of the Volcan de Fuego (*Champion*).

* This belongs to the genus *Trochatella*.

NICARAGUA (*Janson*: young specimens). Probably also Toro Rapids, in the woods (*Gabb: H. turbinata*, Angas, Am. Journ. Conch. v. p. 159).
COSTA RICA (*Gabb* [23]).

This species has a wider geographical distribution than most others of the genus *Helicina*. It is easily recognizable by the thin shell and the sharp tooth-like projection at the base of the columella. In size and colour it is variable. Most specimens are unicolorous—pale yellowish, greenish, or reddish; but many have two reddish-brown bands, one near the suture, and one below the periphery. More variegated specimens, speckled with white, are before me from Teapa in Tabasco, and Cerro Zunil, Las Mercedes, and Chacoj in Guatemala. Sometimes the apex is vividly rose-coloured.

In Guatemala Mr. Champion captured examples of it on both the Atlantic and Pacific slopes, at elevations from a little above the sea-level to 4000 feet; also at Totonicapam, in the Los Altos region, at a much greater altitude.

15. **Helicina fragilis.**

Helicina fragilis, Morelet, Test. Noviss. ii. p. 17 (1851) [1]; Pfr. Monogr. Pneum. Vivent. i. p. 368 [2], & ii. p. 195 [3]; Gray, Cat. Phaneropn. p. 266 [4].

Var. *Helicina elata*, Shuttl. in Bern. Mittheil. 1852, p. 304 (Diagn. no. 3, p. 44) [5]; Pfr. Monogr. Pneum. Vivent. ii. p. 201 [6].

Var. *Helicina merdigera* (Sallé), Pfr. in P. Z. S. 1855, p. 102 [7]; Monogr. Pneum. Vivent. ii. p. 202 [8]; Sow. Thes. Conch. iii. p. 287, t. 272. figg. 243, 244 (magnified) [9]; Reeve, Conch. Icon. xix., *Helicina*, t. 16. fig. 140 [10].

? *Helicina*, nov. spec., Strebel, Abhandl. Geb. Naturw. Ver. Hamb. vi. 1, p. 19, t. 1 *a*. figg. 12, 12 *a*, & t. 2. figg. 12, 12 *a* [11].

Hab. E. MEXICO: Cordova, State of Vera Cruz (*Jacot-Guillarmod* [5 6]); Vera Cruz (*Sallé* [7 8]); Vera Cruz, dead specimens found on the beach (*Strebel* [11]); Mexico [9 10].
W. MEXICO: Omilteme in the Sierra Madre del Sur, State of Guerrero, 8000 feet (*H. H. Smith*).
N. GUATEMALA: Province of Peten [2 4], in the woods, under decayed leaves (*Morelet* [1]); Teleman, in the valley of the Polochic (*Stoll*, *Champion*); Purula 4000 feet (*Champion*).

I have compared Shuttleworth's typical specimen of *H. elata*, from Cordova, with Stoll's Guatemalan example, and the only differences I can find are, that the latter is a little larger, more intensely coloured, and has a somewhat broader peristome.

This species resembles *H. tenuis*, but is much smaller. From *H. flavida* it is distinct by the dentiform prominence at the base of the columella, resembling that of *H. tenuis*.

Strebel's unnamed species [11] is closely allied, but somewhat larger and less elevated; the drawing of the base of the columella, seen from below, agrees exactly with Shuttleworth's and Pfeiffer's specimen of *H. elata*.

16. **Helicina succincta,** sp. n. (Tab. I. figg. 6; 9, var.)

Testa globoso-conoidea, leviter spiratim sulcata, albida vel pallide rufescens, fusco-variegata; anfr. 5, convexiusculi, sutura impressa, ultimus prope aperturam basi planulatus, angulo valde obtuso prope aperturam evanescente cinctus; apertura diagonalis, triangulari-rotundata, peristomate incrassato, breviter expanso, albo, margine columellari subperpendiculari, in tuberculum subrectangulum terminato, callo crasso, parvo, circumscripto.

Diam. maj. 9–10, min. $7\frac{1}{2}$–9, alt. $8\frac{1}{2}$–10 millim.; apert. diam. 4–$4\frac{1}{2}$, alt. obliqua 5–6 millim. (fig. 6).

Hab. E. Mexico: Cordova (*Sallé, Höge*) (fig. 6).

Var. minor, diam. 8, alt. $6\frac{1}{2}$ millim., rufescens, fusco-strigata (fig. 9).

Hab. E. Mexico: Cuesta de Misantla (*Mateo Trujillo*) (fig. 9); Tlacolula, between Las Vigas and Misantla (*Höge*).

Rather near *H. arenicola*, especially as regards the form of the peristome and columella; but of larger size, with more elevated spire, remarkably coarser spiral structure, and more reddish coloration. As the localities are also well separated, and I have seen no intermediate forms, I feel obliged to keep them distinct; it is possible, however, that when additional examples are obtained they may prove to run one into the other.

17. **Helicina raresulcata.**

Helicina raresulcata, Pfr. in Malak. Blätt. viii. p. 173 (1861)[1]; Monogr. Pneum. Vivent. iii. p. 228[2], & iv. p. 269[3]; Strebel, Abhandl. Geb. Naturw. Ver. Hamb. vi. 1, p. 19, t. 1 *a*. fig. 9, & t. 2. figg. 9, 9 *a*[4].

Hab. E. Mexico: Vera Cruz (*Berendt*[1 2]); Vera Cruz, on the plain inland of the sand-hills, on the leaves and stalks of a stinging shrub called "mala muger" (*Strebel*[4]).

18. **Helicina arenicola.**

Helicina arenicola, Morelet, Test. Noviss. i. p. 21[1]; Pfr. in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, *Helicina,* no. 99, p. 73, t. 10. figg. 24–27[2]; Monogr. Pneum. Vivent. i. p. 366[3]; Gray, Cat. Phaneropn. p. 265[4]; Sow. Thes. Conch. iii. p. 286, t. 271. fig. 303[5]; Reeve, Conch. Icon. xix., *Helicina,* t. 28. fig. 250[6].

Hab. N. Yucatan: Sisal, in sandy localities[3 4] (*Morelet*[1]).

The habitat "Cuba" quoted by Sowerby[5] and Reeve[6] is erroneous; Morelet described in the same pamphlet[1] several Cuban species, but to this he expressly attributes the locality given above.

19. **Helicina punctisulcata,** sp. n. (Tab. I. fig. 10.)

Testa conoidea, subangulata, sulcis tenuibus subdistantibus punctiferis sculpta, nitidula, rufescens, interdum fusco-fasciata, subtus pallidior; spira conica, rufa; apertura diagonalis, triangulari-semicircularis, peristomate incrassato, leviter expanso, albo, margine columellari brevi, subperpendiculari, basi subangulato, callo parvo, flavo.

Diam. maj. 9, min. $7\frac{1}{2}$, alt. $7\frac{1}{2}$ millim.; apert. diam. $4\frac{1}{2}$, alt. obliqua 4 millim.

Hab. W. Mexico: Omilteme 8000 feet, on the Sierra Madre del Sur, State of Guerrero, Pacific side of the main Cordillera (*H. H. Smith*).

The suture of the upper whorls appears in some specimens slightly crenulated.

20. **Helicina durangoana.**

Helicina durangoana, Mousson, in Journ. de Conch. xxxi. p. 218. t. 9. fig. 3 (1883) [1].

Helicina, sp., Binney, Land- and Freshwater Shells of N. Am. pt. 3 (Smithson. Miscell. Coll. vii. no. 144), p. 116, with woodcut (shell, operculum, and radula) (1865) [2].

Testa turbinato-conoidea, subangulata, superne leviter spiratim sulcata, albida, nitidiuscula; spira conica; anfr. $5\frac{1}{2}$, convexiusculi; apertura paullum obliqua, rotundato-triangularis, peristomate breviter expanso, albo, superne subsinuato, basali tenui, margine columellari subobliquo, basi in tuberculum prominulum terminato, extus foveolato, callo parvo, crasso, diffuso.

Diam. maj. 10, min. $8\frac{1}{2}$, alt. 8 millim.; apert. diam. $5\frac{1}{2}$, lat. $4\frac{1}{2}$ millim.

Hab. Central N. Mexico: Sierra Madre (*Xantus* [1]); Ventanas, in the State of Durango 2000 feet (*Forrer*).

Approaches somewhat *H. sowerbyana*, Pfr., but is much smaller and more conically elevated, and may be better joined to a Mexican than to a Guatemalan series.

IV. *Delicatulæ.*

Globoso-conicæ, flavæ, minutim striatulæ, parvæ, nitidæ.

21. **Helicina delicatula.**

Helicina delicatula, Shuttl. in Bern. Mittheil. 1852, p. 303 (Diagn. no. 3, p. 43) [1]; Pfr. Monogr. Pneum. Vivent. ii. p. 193 [2].

Helicina heloisæ (Sallé), Pfr. in P. Z. S. 1856, p. 322, t. 35. fig. 17 [3]; Monogr. Pneum. Vivent. ii. p. 202 [4]; Sow. Thes. Conch. iii. p. 288, t. 272. figg. 253, 254 [5]; Reeve, Conch. Icon. xix., *Helicina,* t. 13. fig. 111 (magnified) [6].

Helicina flavida, var., Strebel, Abhandl. Geb. Naturw. Ver. Hamb. vi. 1, p. 17, t. 1 *a.* figg. 10 *c, d,* t. 2. fig. 10 *b* [7].

Hab. E. Mexico: Cordova, State of Vera Cruz (*Jacot-Guillarmod* [1] [2], *Sallé* [3] [4], *Höge*); Vera Cruz (*Strebel* [7]); Mexico [5] [6].

S. Central Mexico: San Carlos, east of Oaxaca (*Höge*).

Var. albida, peristomate crassiore.

Hab. E. Mexico: Atoyac hills, near Cordova, Vera Cruz (*Höge*).

One of the handsomest species, glossy yellow, with or without a red-brown, more or less broad band. I have compared Shuttleworth's original specimen: it is somewhat worn (and is, therefore, not so glossy as fresh ones) and several lines of growth are rather strongly marked, which explains Shuttleworth's words "obsolete et grosse plicatula"; in other respects there is no appreciable difference.

In the variety the whole shell is somewhat thicker, white, with or without band; the callus in the banded specimen is orange.

22. **Helicina oweniana.** (Tab. I. figg. 11, 12.)

a. *genuina*: subelate conoidea, pallida, peristomate aurantio; subinde unifasciata (fig. 12).

Helicina oweniana, Pfr. in P. Z. S. 1848, p. 123[1]; Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, *Helicina*, no. 48, p. 40, t. 7. figg. 35, 36[2]; Monogr. Pneum. Vivent. i. p. 373[3] (excl. var.) & ii. p. 199; Gray, Cat. Phaneropn. p. 270[4]; Sow. Thes. Conch. iii. p. 287, t. 272. figg. 241, 242[5]; Reeve, Conch. Icon. xix., *Helicina*, t. 16. figg. 144[6].

Hab. S.E. Mexico: Chiapas (*Ghiesbreght*[1 2 3 4]); Teapa in Tabasco (*H. H. Smith*).

b. *coccinostoma*: globoso-conoidea, alba, citrina vel fulva absque fasciis, peristomate coccineo.

Helicina coccinostoma, Morelet, Test. Noviss. i. p. 19 (1849)[7]; Sow. Thes. Conch. iii. p. 289, t. 273. figg. 295, 296[8]; Reeve, Conch. Icon. xix., *Helicina*, t. 20. fig. 173 (magnified)[9].

Helicina oweniana, var. β, Pfr. Monogr. Pneum. Vivent. i. p. 373[10]; Gray, Cat. Phaneropn. p. 270[11].

Hab. N. Guatemala: Province of Peten[11] (*Morelet*[7 10]).

c. *anozona*: subglobosa, rubescens vel fulvescens, zona suturali pallida, peristomate luteo (fig. 11).

Helicina oweniana, Tristr. in P. Z. S. 1861, p. 233[12].

Helicina anozona, v. Mart. in P. Z. S. 1875, p. 649[13].

Hab. N. and Central Guatemala: Coban (*Salvin*[12 13]); Cubilguitz, Northern Vera Paz (*Champion*); Teleman, in the valley of the Polochic River (*Stoll*).

These three forms can be well distinguished in the majority of specimens; but there are also some others which are intermediate between them, either in colour or in shape. All those I have seen have a similar fine sculpture.

23. **Helicina notata.**

Helicina notata (Sallé), Pfr. in P. Z. S. 1856, p. 323, t. 35. figg. 18–20[1]; Monogr. Pneum. Vivent. ii. p. 203[2]; Sow. Thes. Conch. iii. p. 287, t. 272. figg. 239, 240[3]; Reeve, Conch. Icon. xix., *Helicina*, t. 31. fig. 276[4].

Hab. E. Mexico: Cordova, State of Vera Cruz (*Sallé*[1 2]); Atoyac (*Höge*); Mexico[3 4].

Easily recognizable by a peculiar dark red spot on the back of the penultimate whorl above the suture, the rest of the shell being unicolorous yellow. The specific name probably refers to this mark; but it is not even mentioned in Pfeiffer's description, although visible in the specimens in his collection. The malleated surface is somewhat like that of many specimens of *H. tenuis*; the spiral ridges bring it near to *H. succincta*.

24. **Helicina flavida.**

Helicina flavida, Menke, Synops. Moll. ed. 1, p. 79 (1828)[1], ed. 2, p. 132 (1830)[2]; Sow. Thes. Conch. i. p. 9, t. 3. figg. 117, 134[3], & iii. p. 287, t. 272. figg. 233–236[4]; Pfr. in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, *Helicina*, no. 52, p. 42, t. 1. figg. 31, 32, & t. 5. figg. 28–

30 [5]; Monogr. Pneum. Vivent. i. p. 376 [6]; Gray, Cat. Phaneropn. p. 272 [7]; v. Mart. in Malak. Blätt. xii. p. 10 (1865) [8]; Sow. Thes. Conch. iii. p. 287, t. 272. figg. 233–236 [9]; Reeve, Conch. Icon. xix., *Helicina*, t. 16. fig. 145 [10]; Strebel, Abhandl. Geb. Naturw. Ver. Hamb. vi. 1, p. 16 (excl. var.), t. 1 *a*, figg. 10, 10 *a*, 10 *b*, & t. 2. fig. 10 [11].

? *Helicina ambieliana*, de Boissy, in Guérin's Mag. Zool. 1835, t. 68 [12]; Potiez et Michaud, Galerie d. Moll. i. p. 228. t. 23. fig. 2 [13].

Helicina trossula, Morelet, Test. Noviss. i. p. 19 [14].

Var. *Helicina strebeli*, Pfr. in Malak. Blätt. viii. p. 173 (1861) [15]; Monogr. Pneum. Vivent. iii. p. 232 [16]; Strebel, loc. cit. p. 18, t. 1 *a* & t. 2. fig. 11 [17].

Var. *Helicina brevilabris*, Pfr. P. Z. S. 1856, p. 380 [18]; Monogr. Pneum. Vivent. ii. p. 204 [19]; Reeve, Conch. Icon. xix., *Helicina*, t. 33. fig. 296 (magnified) [20].

Hab. Central Mexico: Cuernavaca (*H. H. Smith*).

E. Mexico: Papantla (*Deppe & Schiede* [8]); Vera Cruz and Misantla (*Strebel* [11]); Mirador (*Berendt* [15 16]; *Strebel* [15 16 17]); Cordova, Atoyac, and Cuesta de Misantla (*Höge*); Tabasco (*Höge*); Teapa and San Juan Bautista in Tabasco (*H. H. Smith*).

S.E. Mexico: Chiapas [20] (*Ghiesbreght* [18 19]).

N. Guatemala: Province of Peten [7] (*Morelet* [14]); Coban (*Salvin*); Senahu, north of the Polochic Valley (*Champion*); Guatemala [4 9 10].

Var.: viridula, elatior.

Helicina beatrix, Angas, P. Z. S. 1879, p. 484, t. 40. fig. 13 [21].

Hab. Costa Rica: on the hills, up to an elevation of 2500 feet (*Gabb* [21]).

The general colour is very variable in this species—whitish, yellow, pale red, or even somewhat greenish,—often without band, often with a narrow one, few specimens with a broad one like *H. heloisæ*. *H. beatrix* seems to be somewhat more elongate; its colour approaches that of *H. anozona*; a similar coloration—greenish, the penultimate whorl red—is also seen in specimens from Misantla, the form of which is that of the typical *flavida*.

Some of the older conchologists [6 7 12] give also Jamaica, Cuba, and the island of Tobago as habitats of this species; but these assertions are not corroborated by later researches. *H. trochulina*, Orb., from Puerto Rico and ? Cuba, is, indeed, nearly allied, but remarkably thinner, almost diaphanous, and more elongate.

V. *Elate trochiformes.*

25. **Helicina chryseis.** (Tab. I. fig. 14.)

Helicina chryseis, Tristr. in P. Z. S. 1861, p. 233 [1]; Pfr. Monogr. Pneum. Vivent. iii. p. 238 [2].

Hab. Guatemala: mountain-forests of Vera Paz [2] (*Salvin* [1]).

Distinguished from the other small yellow conoidal species by the distinct angulation and the dull somewhat rough (not glossy) surface.

VI. *Depressæ.*

26. **Helicina borealis,** sp. n. (Tab. I. fig. 15.)

Testa depressa, sublævis, striatula, alba, superne maculis griseis biseriatis plus minusve obsoletis picta; spira breviter conoidea, apice prominulo; anfr. 5, ultimus rotundatus, infra paullo magis convexus; apertura parva, valde semicircularis, peristomate incrassato, brevissime expanso, margine columellari brevi, subperpendiculari, in angulum prominulum terminata, callo crasso, circumscripto.

Diam. maj. 10–12, min. 8½–9, alt. 7 millim.; apertura diam. 4½–5, lat. 5–5½ millim.

Hab. N. Central Mexico: Villa Lerdo in Durango, in an open country with patches of Mimosæ (*Höge*).

Approaches in form *H. guadelupensis*, Sow.

27. **Helicina sanguinea.**

Helicina sanguinea, Pfr. in P. Z. S. 1848, p. 124 [1]; Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, *Helicina*, no. 10, p. 17, t. 8. figg. 20, 21 [2]; Pfr. Monogr. Pneum. Vivent. i. p. 345 [3]; Gray, Cat. Phaneropn. p. 249 [4]; Sow. Thes. Conch. iii. p. 292, t. 275. figg. 364, 365 [5]; Reeve, Conch. Icon. xix., *Helicina*, t. 20. figg. 178 [6].

Hab. Honduras [5 6] (*Dyson* [3 4]).

28. **Helicina dysoni.**

Helicina dysoni, Pfr. in P. Z. S. 1848, p. 121 [1]; Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, *Helicina*, no. 63, p. 49, t. 3. figg. 36–39 [2]; Pfr. Monogr. Pneum. Vivent. i. p. 384 [3]; Gray, Cat. Phaneropn. p. 278 [4].

Hab. Venezuela: Cumana (*Dyson* [1 3]).

Var. a: minor.

Helicina dysoni, vars. β–δ, Pfr. Monogr. Pneum. Vivent. i. p. 384 [5]; Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, no. 63, p. 49, t. 8. figg. 27–32 [6]; Sow. Thes. Conch. iii. p. 286, t. 271. figg. 213, 214 [7].

Hab. Honduras [7] (*Dyson* [5]).

Var. b: subglobosa.

Helicina bocourti, Crosse & Fischer, in Journ. de Conch. xvii. p. 251 (1869) [8]

Hab. British Honduras: Belize (*Bocourt* [8]).

Var. c, *jansoni*, v. Mart.: distincte angulosa (diam. maj. 5, alt. 4, apert. 2 millim.) (Tab. I. fig. 16.)

Hab. Honduras: Island of Bonacca, Bay of Honduras (*Gaumer*).

The type is stated to be from Cumana, Venezuela, by Dr. Pfeiffer [1 3]. According to Mr. Bland the same species occurs also on the island of Trinidad, on the coast of Venezuela, and has been described by J. L. Guppy [Ann. & Mag. Nat. Hist. (3) xiv.

(1864), p. 247, and (3) xvii. (1866), p. 47] as *H. barbata*. I have seen no Venezuelan specimens.

Sowerby's figures 217 & 218, Thes. Conch. iii. t. 271, of a shell from the island of St. Thomas, and Reeve's fig. 250, Conch. Icon. xix., *Helicina*, t. 29, seem not to belong to this species, as they are too much pointed at the tip.

VII. *Spiratim liratæ, unidentatæ.* (*Poenia*, H. & A. Adams.)

29. **Helicina lirata.** (Tab. I. fig. 18, showing anim.)

Helicina lirata, Pfr. in Zeitschr. f. Malak. 1847, p. 150[1]; Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, *Helicina*, no. 6, p. 14, t. 4. figg. 40–43[2]; Monogr. Pneum. Vivent. i. p. 341[3] & ii. p. 180[4]; Gray, Cat. Phaneropn. p. 246[5]; Sow. Thes. Conch. iii. p. 281, t. 268. figg. 88, 89[6]; Reeve, Conch. Icon. xix., *Helicina*, t. 14. fig. 121[7]; Strebel, Abhandl. Geb. Naturw. Ver. Hamb. vi. 1, p. 21, t. 1 *a*, & t. 2. figg. 8, 8 *a*[8]; Tristr. P. Z. S. 1863, p. 413[9].

Helicina lyrata, Angas, P. Z. S. 1879, p. 484[10].

Helicina unidentata (Pfr.), Sow. loc. cit. t. 268. fig. 87[11]; Reeve, loc. cit. t. 14. fig. 122[12].

Hab. E. Mexico: Vera Cruz, at the "bajadas," on the ground beneath shrubs (*Strebel*[8]).

S. & S.E. Mexico: Chiapas (*Ghiesbreght*[4]); Teapa and San Juan Bautista in Tabasco (*H. H. Smith*).

Yucatan[6 7] (*Hegewisch*[1 3 5]).

N. Guatemala: mountain forests of Vera Paz (*Salvin*[9]).

S. Guatemala: Retalhuleu, in the woods, on the ground, never ascending plants (*Stoll*).

Venezuela (*Tams, Engel, and Starke, in mus. Berol.*).

Var.

Helicina rusticella, Morelet, Test. Noviss. i. p. 21 (1849)[13].

Helicina unidentata, var., Pfr. Monogr. Pneum. Vivent. i. p. 341[14]; Gray, Cat. Phaneropn. p. 246[15].

Hab. Yucatan: Island of Carmen, in the Gulf of Campeche (*Morelet*[13 14 15]).

Var.

Helicina unidentata, Pfr. in P. Z. S. 1848, p. 124[16]; Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, *Helicina*, no. 5, p. 14, t. 9. figg. 14–17[17]; Monogr. Pneum. Vivent. i. p. 341[18]; Gray, Cat. Phaneropn. p. 346[19].

Hab. Honduras (*Dyson*[16 17]).

Var.

Helicina semistriata, Sow. Thes. Conch. iii. p. 281, t. 268. fig. 86[20]; Tate, in Am. Journ. Conch. v. p. 159 (1870)[21].

Hab. N. Panama: Boca del Toro, Chiriqui, in the woods and coco-nut groves (*Gabb*[21]).

It seems that the distinction between the above-named species cannot be maintained. According to Pfeiffer's original figures, *H. unidentata* is rather flat and more rounded

Pl. 92

than *H. lirata*, and the spiral ridges are said to be alternately weak and strong in *H. unidentata* [18]; but the specimens in Pfeiffer's collection show no remarkable difference from *H. lirata*. Sowerby's and Reeve's *H. unidentata* do not agree at all with Pfeiffer's; they are even somewhat more elevated than their *H. lirata*.

H. semistriata is said to be smooth below; but *H. lirata*, *H. unidentata*, and *H. rusticella* are conspicuously glossy and only faintly ridged on the under surface.

VIII. *Dubious Helicinæ.*

Of small size, with thin straight peristome (*Idesa*, H. & A. Adams): these, perhaps, representing only the young state of other species.

Helicina antoni.

Helicina antoni, Pfr. in Zeitschr. f. Malak. 1848, p. 88 [1]; Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, *Helicina*, no. 55, p. 44, t. 5. figg. 35–38 [2]; Monogr. Pneum. Vivent. i. p. 377 [3]; Gray, Cat. Phaneropn. p. 273 [4]; Sow. Thes. Conch. iii. p. 285, t. 270. fig. 181 (male) [5]; Reeve, Conch. Icon. xix., *Helicina*, t. 19. fig. 165 [6].

Hab. Honduras [5 6] (*Dyson* [1 3 4]).

Helicina diaphana.

Helicina diaphana, Pfr. P. Z. S. 1850, p. 98 [1]; Monogr. Pneum. Vivent. i. p. 384 [2]; Gray, Cat. Phaneropn. p. 279 [3]; Sow. Thes. Conch. iii. p. 291, t. 275. fig. 341 [4]; Reeve, Conch. Icon. xix., *Helicina*, t. 28. fig. 251 [5].

Hab. Honduras [4 5] (*Dyson* [1 2 3]).

Helicina exigua.

Helicina exigua, Pfr. P. Z. S. 1848, p. 121 [1]; Monogr. Pneum. Vivent. i. p. 353 [2]; Gray, Cat. Phaneropn. p. 255 [3] (nec *H. exigua*, Homb. & Jacq.).

Hab. Honduras (*Dyson* [1 2 3]).

Helicina microdina.

Helicina microdina, Morelet, Test. Noviss. ii. p. 18 (1851) [1]; Pfr. Monogr. Pneum. Vivent. i. p. 354 [2]; Gray, Cat. Phaneropn. p. 256 [3].

Hab. N. Guatemala: Vera Paz [3], common (*Morelet* [1 2]).

Helicina mohriana.

Helicina mohriana, Pfr. in Malak. Blätt. viii. p. 172 (1861) [1]; Monogr. Pneum. Vivent. iii. p. 219 [2].

Hab. E. Mexico: Orizaba [2] (*Mohr* [1]).

SCHASICHILA.

Schasicheila, Shuttleworth, in Bern Mittheil. 1852, p. 301 (Diagn. no. 3, p. 41).

Near *Helicina*, but covered with a thick dark periostracum forming spiral rows of membranaceous rays; upper edge of the aperture obliquely cut off; umbilical callus small; operculum pointed above and below, the lower point overtopping the edge of the aperture.

Nearly peculiar to Mexico and Central America; only an aberrant species on the Bahama Islands.

Nomen.	Series laciniarum periostraci.	Forma.	Anfr. supp.	Diam.	Alt.	Patria.
nicoleti, *Shuttl.*	3	subangulata.	non convexi.	millim. 15–17	millim. 10–12½	E. Mexico.
pannucea, *Morel.* . .	parum distinctæ.	,,	,,	10–12	8–9	E. Mexico; Guatemala.
alata, *Pfr.*	4–5	rotundata.	convexi; sutura profunda.	10	8–9	E. Mexico.

1. Schasichila nicoleti.

Schasicheila nicoleti, Shuttl. in Bern Mittheil. 1852, p. 302 (Diagn. no. 3, p. 42) [1]; Pfr. Novit. Conch. i. p. 89, t. 25. figg. 7–9 [2]; Monogr. Pneum. Vivent. ii. p. 220 [3].

Helicina nicoleti, Sow. Thes. Conch. iii. p. 280, t. 267. fig. 67; Reeve, Conch. Icon. xix., *Helicina*, t. 13. fig. 109.

Hab. E. Mexico: Cordova, State of Vera Cruz (*Jacot-Guillarmod* [1 3], *Sallé* [3]); Cerro de Plumas, near Cordova, Jalapa (*Höge*).

M. Nicolet, in La Chaux de Fonds, Neufchâtel, gave specimens of this shell to Shuttleworth in the year 1845.

2. Schasichila pannucea.

Helicina pannucea, Morelet, Test. Noviss. i. p. 21 (1849) [1]; Pfr. Monogr. Pneum. Vivent. i. p. 369, footnote [2]; Sow. Thes. Conch. iii. t. 267. figg. 68, 69 [3].

Schasicheila pannucea, Shuttl. in Bern Mittheil. 1852, p. 301 (Diagn. no. 3, p. 41) [4].

Schasichila pannucea, v. Mart. P. Z. S. 1875, p. 649 [5].

Helicina alata (Sow.), Reeve, Conch. Icon. xix., *Helicina*, t. 13. fig. 107 [6].

Schasicheila alata, H. & A. Adams, Gen. rec. Moll. ii. p. 306, t. 87. figg. 6, 6*a* (operculum) [7]; Tristr. P. Z. S. 1863, p. 412 [8].

Hab. N. Central Mexico: Aguas Calientes (*Höge*).

E. Mexico: Jalapa (*Höge*).

N. Guatemala: San Luis, province of Peten (*Morelet* [1 2]); Coban, Vera Paz (*Salvin* [5 8]); Senahu, in the mountains north of the Polochic valley (*Champion*).

S. Guatemala: El Reposo 800 feet, above Champerico, Pacific slope (*Champion*).

3. **Schasichila alata.**

Helicina alata (Menke), Pfr. in Zeitschr. f. Malak. 1848, p. 87[1]; Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, *Helicina*, no. 54, p. 43, t. 5. figg. 18–20[2]; Monogr. Pneum. Vivent. i. p. 368[3], ii. p. 221[4]; Gray, Cat. Phaneropn. p. 267[5]; Sow. Thes. Conch. t. 267. figg. 65, 66[6].

Schasicheila alata, Shuttl. in Bern Mittheil. 1852, p. 301 (Diagn. no. 3, p. 41)[7].

Helicina (*Schasicheila*) *alata*, v. Mart. in Malak. Blätt. xii. p. 10 (1865)[8].

Schasichila alata, Strebel, Abhandl. Geb. Naturw. Ver. Hamb. vi. 1, p. 23, t. 4. fig. 7[9].

Helicina pannucea, Reeve, Conch. Icon. xix., *Helicina*, t. 13. fig. 108 (nec Morelet)[10].

Hab. E. Mexico: Mexico (*Menke*[1 3 4 5]); Cordova, State of Vera Cruz (*Sallé*[4 8], *Höge*); Vera Cruz (*Friedel*[8]); Mirador and San Cristobal near Orizaba (*Strebel*[9]); Atoyac (*H. H. Smith*); Jalapa (*Höge*).

PROSERPINA.

Procerpena, Gray, Syn. Brit. Mus. 1840, p. 90.

Proserpina, Gray, Syn. Brit. Mus. ed. 1842, p. 90; Pfeiffer, Monogr. Helic. Vivent. i. p. 18.

Shell depressed, with basal callus as in *Helicina*; peristome simple, inner margin ending in a plait; revolving lamellæ inside the aperture. No operculum.

Subgen. Ceres: Superne sculpturata, carinata; faux utrinque trilamellata.

Nomen.	Spira.	Coloratio.	Sculptura supera.	Diam. maj.	Alt.	Patria.
				millim.	millim.	
eolina, *Ducl.*	subplana.	pallide aurantia, cuticula albescente.	rugulis confertis, antrorsum descendentibus.	23–24	9 10	E. Mexico.
sallæana, *Gray* ..	conoidea.	,,	striis aperturæ parallelis, subgranulosis.	22–23	12	E. Mexico.
Subg. Proserpinella: Utrinque polita, non carinata; lamella 1 parietali.						
berendti, *Bland*...	convexiuscula.	alba.	ad suturam plicatula.	3	$1\frac{1}{2}$	E. Mexico.

The whole genus confined to the islands and shores of the Caribbean Sea and Mexican Gulf; the two subgenera peculiar to E. Mexico.

Subgenus Ceres, Gray.

Ceres, Gray, P. Z. S. 1856, p. 102.

1. **Proserpina (Ceres) eolina.**

Carocolla eolina, Duclos, in Guérin's Mag. Zool. 1833 (dated 1834), Class V. t. 30[1] (copied in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, *Helix*, ii. p. 11, t. 100. fig. 10).

Odontostoma (*Carocolla*) *eolinum*, Pfr. Monogr. Helic. Vivent. i. p. 11[2].

Proserpina eolina, Pfr. Monogr. Helic. Vivent. iii. p. 290 [3].

Ceres eolina, Gray, P. Z. S. 1856, p. 102 [4]; Pfr. P. Z. S. 1856, t. 35. figg. 23, 24 [5]; Novit. Conch. i. p. 92, t. 25. figg. 1–3 [6].

Ceres eolina, Pfr. Monogr. Auric. Vivent. p. 168 [7].

Hab. E. Mexico: Mexico [3] (*Férussac* [2]), State of Vera Cruz (*Sallé* [1]); Cerro de Plumas, near Cordova (*Höge*).

2. **Proserpina (Ceres) sallæana.**

Ceres salleana, Gray, P. Z. S. 1856, pp. 100, 102 (woodcut of the radula) [1]; Pfr. Monogr. Auric. Vivent. p. 168 [2]; Monogr. Pneum. Vivent. iv. p. 295 [3].

Proserpina (*Ceres*) *salleana*, Pfr. P Z. S. 1856, p. 322, t. 35. figg. 21, 22 [4]; Novit. Conch. i. p. 93, t. 25. figg. 4–6 [5].

Hab. E. Mexico: Cordova, State of Vera Cruz, in dense woods under leaves (*Sallé* [1 2 3 4]); Huatusco, barranca de Dos Puentes (*Mohr* [3]); Cerro de Plumas, with the preceding and in greater number (*Höge*).

Colour on the whole and disposition of the lamellæ quite the same as in the preceding; perhaps only a sexual difference.

Subgen. Proserpinella, Bland.

Proserpinella, Bland, Ann. Lyc. N. York, viii. p. 157 (1865).

3. **Proserpina (Proserpinella) berendti.**

Proserpinella berendti, Bland, in Ann. Lyc. N. York, viii. p. 157, fig. 2 (1865) [1]; Strebel, Abhandl. Geb. Naturw. Ver. Hamb. vi. 1, p. 11, t. 4. fig. 5 [2]; Pfr. Monogr. Pneum. Vivent. iv. p. 297 [3].

Hab. E. Mexico: Mirador, Atlantic slope, 3000 to 4000 feet (*Berendt* [1 3], *Strebel* [2]).

GASTROPODA PULMONATA MONOICA.

Sexes united. No operculum.

STYLOMMATOPHORA.

Two pairs of feelers, the eyes on the tip of the upper ones.

Fam. AGNATHA.

No jaw. Teeth of the radula aculeiform, in oblique rows, median tooth very small or absent.

STREBELIA.

Strebelia, Crosse & Fischer, Journ. de Conch. xvi. p. 90 (1868).

Shell cornet-like, paucispiral, subcylindrical, smooth, shining; aperture large; inner edge of the aperture simple, arcuated; columella thin, not truncate. Animal three times the length of the shell, warty, with a median furrow on the back; no labial palps. Teeth of the radula pointed, with a blunt prominence at the inner side; middle tooth present.

Only one species.

1. **Strebelia berendti.**

Physella berendti, Pfr. in Malak. Blätt. viii. p. 71, t. 1. figg. 1–4 (1861)[1]; Berendt, ibid. xii. p. 207[2]; Binney, Land and Freshw. Shells N. Am. ii. p. 73, fig. 118[3]; Pfr. Monogr. Helic. Vivent. v. p. 40[4].

Strebelia berendti, Crosse & Fischer, in Journ. de Conch. xvi. p. 90 (1868)[5]; Miss. Scient. Mex., Mollusca, p. 12, t. 1. figg. 1, 1 *a*, *b*[6]; Strebel, Beitr. Mex. Land- und Süssw.-Conch. ii. p. 3, t. 4. fig. 1[7], iii. pp. 5, 9, t. 1. figg. 1–10, t. 2. figg. 1–11 (anatomy)[8].

Hab. E. Mexico: Mirador and Coscomatepec, at the roots of trees (*Berendt*, *Strebel*, and *Sartorius*[1–7]); Pacho near Jalapa, in a wood, beneath rotten leaves and moss on the ground (*Doña Estefania*[8]); Mexico, without nearer indication of locality (*Höge*).

GLANDINA.

Glandina, Schumacher, Essai N. Syst. p. 202 (1817); Morelet, Journ. de Conch. iii. p. 27 (1852).
Polyphemus, Montf. 1810 (nec O. Fr. Müller, 1785); *Cochlicopa,* Fér. 1821, part.; *Oleacina* (Bolten, inedit. 1798), Gray, 1847.

Shell oblong or ovate, more or less fusiform, imperforate, usually with granulate or costulated sculpture, which is more distinctly expressed in the upper part of the whorls below the suture, with a thin fugacious periostracum (epidermis); mostly unicolorous. Aperture elliptico-oblong, much narrower above, the outer margin simple; columella arcuated forwards and abruptly truncate below. Living animal elongated in its fore part; eye-peduncles ending in a swelling, which is obliquely inflexed and prolonged beyond the eyes; rather long labial palps, besides the four feelers. Teeth of the radula narrow, spiniform; a small median tooth. Carnivorous, nocturnal.

Good figures of the living animal and an account of its anatomy are to be found in Fischer & Crosse's Miss. Scient. Mex., Mollusca, i. pp. 70–82, t. 3. fig. 2 *a*, & t. 2. fig. 12 *a*; and in H. Strebel's Beitr. z. Kenntniss der Fauna Mexik. Land- und Süsswasser-Conchylien, iii. pp. 35–44, t. 10. figg. 8–17, tabb. 11, 13–21, 22. fig. 1.

The distinction of sections and species is remarkably difficult in this genus, as the general shape is somewhat inconstant in the same species, and the characters taken

from the sculpture, the varices, and the columella, good as they are in themselves, show many degrees of variation according to the different species. The sculpture consists generally of vertical (longitudinal) plaits, riblets, or striæ, crossed by spiral impressed furrows. If both are strongly expressed, the sculpture may be termed "plexa" (braided); in some species the spiral furrows are very weak, scarcely discernible under an ordinary lens, and in others they seem to be wanting throughout. It is not easy to clearly describe these gradations in a few words, and therefore only the extremes are mentioned in the adjoining table. The varices are interruptions of growth, marked by an impression and by colour, either a dark streak alone or a dark streak preceded by a pale one: they are very distinct and numerous in some species, more or less rare and obsolete in others; so that it is not at all satisfactory to form two sections in this genus by the presence or absence of varices, as Fischer and Crosse have done.

Many species have been described only from one or a few examples, and not figured; they have been admitted and handed down from work to work by subsequent writers, who have themselves described new species, without the possibility of comparing the specimens. As it is rather difficult in this genus to determine the species from description alone, and many of them present considerable individual variations, it is to be feared that several species have been twice or thrice introduced as new, and that the actual number of species is not really so large. I have fortunately been able to compare the typical specimens of Shuttleworth's species (kindly lent me by Prof. Th. Studer of Berne), some of Pfeiffer's types (lent me by Dr. H. Dohrn), and drawings of others in the British Museum (kindly furnished by Edgar Smith), with the material of the Berlin Museum, which includes Albers's and many of Strebel's types, and with the shells collected by Messrs. Salvin, Godman, and their friends in various parts of Mexico and Central America. This has enabled me to trace many well-characterized species through various localities, and to diminish the number of so-called species by reducing some to mere synonyms or subordinate varieties. On the other hand, I have been compelled, somewhat against my wish, to name several new species on single or few specimens; and to admit species proposed by previous authors, without being able to indicate very striking differences. In this genus, as in many others, it seems to be very difficult, or rather impossible, to draw a clear line of distinction between local variations and nearly allied species. Only one who can observe many specimens in various localities, and one who is well acquainted with the minute differences, can hope to settle this question. At all events, I have been able by the help of my friends to figure many—true or pretended—species which have not hitherto been figured, and were therefore scarcely recognizable by the practical conchologist.

The Mexican and Central-American species of this genus may be arranged as follows:—

A. *Plexæ*: sculpture more distinctly granoso-reticulate; aperture large; size rather large . . . . . *indusiata, vanuxemi, sowerbyana, coulteri, cuneus, aurata.*

B. *Marginatæ*: elongate; suture marked by a well-limited bandlet; size rather large . . . . . *fusiformis, ghiesbreghti, decussata, tenella, cumingi, carmenensis.*

C. *Turritæ*: elongate; aperture rather short; size variable . . . *liebmanni, audebardi, isabellina, longula, pinicola, turris, mazatlanica, pseudoturris, anomala, simplex, conularis, excavata, largillierti, multispira, oblonga, bellula.*

D. *Lanceolatæ*: elongate, but the last whorl more convex; generally intensely coloured . . . . . *lanceolata, aurantiaca, decidua.*

E. *Biconicæ*: spire shorter, tapering; last whorl swollen; pale coloured, with distinct varices; outer margin of the aperture often angularly produced; size moderate . . . . . *cordovana, delicatula, conferta, speciosa, ambigua, ? tortillana.*

F. *Turgidæ*: ovate, apex rather obtuse; size moderate or small . *orizabæ, turgida, filosa, fischeri, sulcifera, albersi, mitriformis, monilifera, obtusa, stigmatica, nana.*

G. *Difficiles*: columella distinctly twisted . . . . . *difficilis.*

G. striata and *G. plicatula* will find their place in the subdivision B, *Marginatæ*; *G. truncata* may be placed either in C, *Turritæ*, or in F, *Turgidæ*, the variety *parallela* agreeing better with the former, the var. *bullata* with the latter.

It must be agreed that these groups run very much one into the other, and that it is very difficult, or almost impossible, to characterize them more precisely, but they will perhaps help somewhat to determine single species.

The peculiar features of the living animal were first described by Say in 1831, the anatomical characters by Raymond and Ad. Schmidt in 1853. The known species were first enumerated as forming a distinct subdivision by Férussac in 1821, and then as a genus by Morelet in 1852; whereas Bolten and Montfort, and even Schumacher himself, founded their genera only on one species, and that an aberrant one (*G. glans*, Brug.).

The geographical distribution of the genus *Glandina* is predominantly Central-American, the majority of the species, including the largest, being found there. A few species, nearly allied, inhabit the northern part of South America, one only, *G. striata*, extending to the southern half of that continent; in the southern states of North America three species are found, *G. truncata* (with several varieties), *G. corneola*, and *G. texasiana*.

The West-Indian Islands have a number of species, which differ more or less considerably from the continental ones; they belong to distinct subgenera, as *Varicella* and *Oleacina* sensu stricto.

Within the limits of Mexico and Central America they are almost equally numerous and well developed on the Atlantic slope of Mexico proper (E. Mexico) and in Guatemala, the two provinces which have been most diligently and successfully investigated; the species of both these districts are partly the same, partly not very different from one another. *G. sowerbyana* extends, so far as we know, from the State

of Vera Cruz into that of Panama. The central plateau of Mexico seems to be essentially poorer in this genus than the rich eastern slope; whereas in Guatemala the northern limestone regions are even richer than the volcanic slopes to the Pacific, and have generally the same species.

Geographical Distribution of the American Continental Species of Glandina.

Southern States of N. America . .	*truncata* (incl. *parallela* & *bullata*), (?) *vanuxemi*, *corneola*, *texasiana*.
N.E. Mexico	*longula*.
N.W. Mexico	*liebmanni* var. *insignis*, *mazatlanica*, *excavata*, *albersi*, (?) *turris*.
Central Mexico	*coulteri*, *liebmanni*, *audebardi* (a), *fischeri*, *sayulana*.
E. Mexico	*vanuxemi* (incl. var. *guttata*), *sowerbyana*, *coulteri*, *tenella*, *audebardi* (a, b, c), *longula* var. *jalapana*, (?) *filosa*, *orizabæ*, *lineata*, *monilifera* var. *pulcherrima*, ? *difficilis*, *gracilis*, *cordovana*, *delicatula*, *conferta*, *speciosa*, *ambigua*, *nana*, *stigmatica*, *margaritacea*, *modesta*, *perpusilla*.
S.W. & S. Mexico (Guerrero, Oaxaca, Tehuantepec)	*indusiata*, *vanuxemi*, *sowerbyana*, *cuneus*, *liebmanni*, *cognata*, *radula*, *audebardi* (a, d), *lanceolata*, *pseudoturris*, *simplex*, *decidua*, *turgida*, *multispira*, *conferta*, *monilifera*.
Chiapas	*ghiesbreghti*, *monilifera*, *pulchella*.
Tabasco	(?) *cumingi* (a, b).
Yucatan	*carmenensis*, *largillierti*.
N. Guatemala (limestone)	*sowerbyana*, *aurata*, *fusiformis*, *decussata*, *cumingi* (b), *largillierti*, *monilifera*.
Central Guatemala (metamorph.) . .	*aurata*, *pinicola*.
S. Guatemala (volc.)	*carmenensis*, *sowerbyana*, *fusiformis*, *cumingi* (a, b).
Honduras	*cumingi* var. *rubromarginata*, *carmenensis*.
Salvador	no species known hitherto.
Central Nicaragua	*cumingi* var. *rosea* & var. *flavida*.
W. Nicaragua	*obtusa*.
Costa Rica	*sowerbyana*, (?) *aurata*, *cumingi* var. *rubromarginata*, (?) *isabellina*, (?) *largillierti*, *aurantiaca*, *anomala*, *mitriformis*.
E. Panama	*sowerbyana*.
Colombia	*stübeli*, *striata*, *isabellina* (Strebel, nec Pfr.), *ornata*, *lucida*, *plicatula*.
Venezuela	*plicatula*, *subvaricosa*.
Guiana	*striata*, *fulminea*.
Ecuador, E. Peru	*striata*, *cylindrus*, *saccata*.
Bolivia	*striata*.
? Brazil	*striata*.

Comparative Table of the Species of *Glandina*.

Nomen.	Figura.	Sculptura.	Coloratio.	Sutura.	Spira versus apicem.	Columella.	Long.	Diam.	Apert.	Patria.
							mm.	mm.	mm.	
indusiata, *Pfr.*	ventricoso-ovata.	læviuscula, nitida, obsolete plexo-granulata.	pallide flavida, periostraco fusco deciduo.	denticulata.	obesa.	arcuata.	50 43	26 22	32 26	Central & S.W. Mexico.
vanuxemi, *Lea* ..... (coronata, *Pfr.*)	saccato-oblonga.	plexo-granulata, nitidula.	pallide flava, maculis albis et lineolis fuscis spiralibus.	valde et inæqualiter denticulata.	,,	,,	97 70 53	35 31 24	51 45 34	Central & S.W. Mexico.
——, var.	,,	,,	,,	,,	attenuata.	,,	100	42	58	S.W. Mexico.
——, var. guttata, *Fisch. & Crosse.*	saccato-cylindrica.	,,	griseo-flavescens, maculis albis et varic. fuscis.	inæqualiter denticulata.	obesa.	valde arcuata.	68 64	28 28	40 37	Central Mexico.
sowerbyana, *Pfr.*	ovato-elongata, subsaccata.	plexo-granulata, nitidula, sericea.	pallide fulva (detrite rufo-grisea), varicib. fuscis.	denticulata, obsolete marginata.	attenuata.	arcuata.	109 103 90	46 42 40	55 52 54	E. Mexico, S.W. Mexico, Guatemala, Costa Rica, Panama.
——, var. estefaniæ, *Streb.*	fusiformis.	,,	,,	,,	,,	,,	59	24½	31	E. Mexico.
coulteri, *Gray*	subconoideo-oblonga.	leviter plexo-granulata.	pallide fulva, varicibus fusco-albis.	levissime denticulata.	sat obesa.	,,	90 76 67	30 27 26	57 41 37	E. and Central Mexico.
cuneus, *v. Mart.*	saccato-lanceolata.	subtiliter plexo-granulata, tenuis.	fulvo-fusca, nitidula.	leviter crenulata.	,,	,,	49 51	19 19	29 27	S.W. Mexico.
aurata, *Morel.*	fusiformi-oblonga.	dense granulata.	obscure fulva, strigis fuscis, varicib. aureis.	obtuse inæqualiter denticulata.	,,	rectiuscula.	87 84 (94) 78	36 34½ (36) 34	42 (49) 43	Guatemala, Costa Rica.
fusiformis, *Pfr.*	ovato-fusiformis.	confertim costulata, levissime decussata.	aurantia, strigis fuscis.	marginata, leviter crenulata.	attenuata.	subrecta.	87 99	38 40	49 55	Guatemala.
——, var. miltochila, *v. Mart.*	,,	,,	pallide flava, peristomate rubro.	,,	,,	,,	107	42	58	Guatemala.
ghiesbreghti, *Pfr.*	angulose fusiformis.	plicato-costulata, levissime decussata.	pallide fulva.	marginata, leviter crenulata.	,,	arcuata, supra intumescens.	55	20½	19½	Chiapas.
decussata, *Desh.*	attenuato-fusiformis.	leviter costulata, levissime decussata.	rubescenti-fulva, nitidula.	leviter marginata, albida, crenulata.	,,	,,	49 50	19 18½	25 26	N. Guatemala.
tenella, *Streb.*	fusiformis.	leviter costulata.	pallide flava.	marginata, crenulata.	modice attenuata.	subrecta.	32	15	19	E. Mexico.
cumingi, *Beck* ..... (*a*) fulvo-rosea. (*b*) flavida. (*c*) rubromarginata.	ovato-oblonga.	leviter costulata, obsolete decussata.	(*a*) rufescens vel rosea, (*b*) flavida, (*c*) flavida, sutura rubra.	eximie marginata, crenulata.	obesa.	,,	46 50 45 44	19 22 20 21	26 30 25 25	S.E. Mexico, Guatemala, Honduras, Nicaragua, Costa Rica, Panama.

carmenensis, *Morel.*.....	fusiformi-oblonga.	costulata, obsolete decussata.	rufescens (flavida).	marginata, crenulata.	subattenuata.	rectiuscula.	49	20	28	Yucatan, Guatemala, Honduras.
liebmanni, *Pfr.*.....	elongata, subcylindrica.	plicato-costulata.	cinereo-albida, opaca.	inæqualiter denticulata.	modice obesa.	recta, brevis.	70 64	25 24	31 35	Central and S.W. Mexico.
——, var. insignis, *Pfr.* .	subovato-oblonga.	,,	carnea, plicis albidis.	,,	,,	,,	48	19½	25	N.W. Mexico.
audebardi, *Desh.*	attenuato-elongata.	complanato-pliculosa.	pallide flava vel albida, nitidula.	denticulata.	sat obesa.	subrecta, brevis.	62 58 53	22 21 20	27 27 27	E., Central, and S.W. Mexico.
——, var. amœna, *v. Mart.*	subovato-oblonga.	confertim striata, anfr. ult. læviore.	albida, nitidula.	leviter denticulata.	,,	,,	45 43	18 18	22 21	E. Mexico.
——, var. miradorensis, *Streb.*	,,	,,	cornea, diaphana.	,,	,,	,,	43	19	23	E. Mexico,
——, var. minor	,,	,,	isabellina.	denticulata.	,,	,,	31	13½	16	S.W. Mexico.
isabellina, *Pfr.*	fusiformi-oblonga.	spiratim striatula.	isabellina, diaphana.	marginata.	obtusa.	strictiuscula.	26	10	13	Mexico.
longula, *Fisch. & Crosse* .	fusiformi-turrita.	leviter decussata.	flava.	denticulata.	modice obesa.	subrecta.	45	16	22	N.E. Mexico.
——, var. jalapana, *v. Mart.*	,,	,,	fulvo-fusca.	,,	,,	modice arcuata.	55	19	26	E. Mexico.
pinicola, *Fisch. & Crosse*	subcylindrico-oblonga.	obsolete rugato-plicata, decussata.	fulvido-fusca.	irregulariter denticulato-crenata.	obtusa.	arcuata.	50½	21	27	Central Guatemala.
turris, *Pfr.*	conico-oblonga.	subinæqualiter striatula.	corneo-flavescens.	levissime crenulata.	sat obesa.	subrecta.	43 38	15 15	19 17½	N.W. Mexico.
mazatlanica, *v. Mart.* ...	subcylindrica.	costulato-striata.	fulva.	subangulata, non denticulata.	,,	,,	32	12 13	16	N.W. Mexico.
pseudoturris, *Streb.*.....	turrita.	leviter costulato-striata.	obscure fulva.	marginata.	,,	,,	26	10⅔	13	S.W.&S.Mexico
anomala, *Ang.*	,,	complanato-striata.	fusca.	valide granulata.	obesa, obtusa.	recta.	46	14	15	S.E. Costa Rica.
simplex, *Streb.*	,,	leviter striatula, spiratim striata.	flava, nitida.	indistincte marginata.	obesa.	modice arcuata.	31	11	14	S. Mexico.
conularis, *Pfr.*	,,	sublævis.	fusculo-carnea.	filo albido marginata.	obtusa.	levissime arcuata.	23	9	11	Mexico.
excavata, *v. Mart.*	subcylindrica.	confertim striatula.	flava, nitidula.	indistincte marginata.	valde obesa.	profunde arcuata, sulcata.	31	11½	16	N.W. Mexico ?
largillierti, *Pfr.*	anguste ovato-oblonga.	leviter striatula, spiratim distincte striata.	pallide carneo-flavida.	denticulata, marginata.	obesa, distinctius costulata.	subrecta.	30 27 23	11 11 9½	13 13 11	Yucatan, N. Guatemala, S.E.CostaRica.
multispira, *Pfr.*	oblongo-ovata, basi saccata.	leviter striatula.	corneo-fusca.	crenulato-marginata.	sat obesa.	,,	26	11	12	S. Mexico.

Comparative Table of the Species of *Glandina* (*continued*).

Nomen.	Figura.	Sculptura.	Coloratio.	Sutura.	Spira versus apicem.	Columella.	Long.	Diam.	Apert.	Patria.
oblonga, *Pfr.*	subturrita, cylindracea.	sublævis, varicibus impressis.	fulva, nitida.	leviter striatula, sublacera.	convexa.	parum arcuata.	mm. 15	m m. 6	mm. 8½	E. Mexico.
bellula, *Crosse & Fisch.*	fusiformis.	sublævis.	pallide flava, diaphana.	granulato-marginata.	attenuata.	leviter arcuata.	21½	8	9	Mexico.
lanceolata, *v. Mart.*	,,	sublævis, ad suturam plicatula.	flavido-fusca, nitida.	levissime marginata.	modice attenuata.	arcuata.	30	12	14½	S.W. Mexico.
aurantiaca, *Ang.*	,,	lævis, nitida.	aurantia.	subsimplex, purpurea.	subattenuata.	subarcuata.	20	9	10	Costa Rica.
decidua, *Pfr.*	subfusiformis.	,,	albida, periostraco strigatim deciduo.	vix marginata.	,,	paullum arcuata.	36	14	15½	S. Mexico.
cordovana (*Pfr.*), *Streb.*	attenuato-ovata.	confertim leviter plicatula.	albida, varicibus angustis.	anguste marginata, nodulosa.	attenuata, acutiuscula.	subrecta.	32 29	14 13	18 17	E. Mexico.
delicatula, *Shuttl.*	fusiformi-turrita.	,,	carneolo-flavescens.	subangulata, subsimplex.	attenuata.	valde arcuata.	22 29	8⅓ 10½	11½ 13½	E. Mexico.
conferta, *Pfr.*	attenuato-oblonga.	,,	albida vel pallide flava, strigis fuscis.	submarginata, in anfr. ult. granulata.	attenuata, acutiuscula.	arcuata.	34 25 25 18½	13 10 11½ 9½	18 13 11⅓ 10	S. & E. Mexico.
——, var. crossei.....	,,	,,	unicolor.	sublævis.	,,	,,	25 – 25	10 – 11½	11 – 13	E. Mexico.
speciosa, *Pfr.*	biconico-oblonga.	conferte plicata, infra lævis.	carnea, varicibus impressis, fusco-albis.	nodulato-crenulata.	modice attenuata.	subrecta.	23½	11	13	E. Mexico.
——, var. *b* (*Fisch. & Crosse*).	cylindrico-fusiformis.	,,	,,	,,	,,	arcuata.	20½	9	11	E. Mexico.
——, var. *c* (*Strebel*) ...	ovato-saccata.	leviter costulata, infra lævis.	,,	? callosa.	,,	substricta.	22	9¾	12¾	E. Mexico.
ambigua, *Pfr.*	ovato-conica.	lævis.	flavida, zona alba.	simplex.	attenuata.	recta.	20 20	10 9	10½ 9½	E. Mexico.
tortillana, *Pfr.*.....	subattenuato-ovata.	leviter striatula, nitida.	pallide cornea, maculis opacis.	leviter marginata, angulata.	sat obesa.	valde arcuata.	25 20	12 8	12½ 10	Centr. Am.
orizabæ, *Pfr.*	ovato-oblonga.	,,	flava, varicibus albis.	subsimplex, alba.	,,	arcuata.	42 38	18 16½	 20½	E. Mexico.

turgida, *Pfr.*	subtusiformi-ovata.	leviter confertim striata.	isabellina, parum nitida.	levissime crenulata.	obtusa.	stricta.	30	13	5	S. Mexico.
——, var. sayulana	ovato-oblonga.	leviter striata.	rubello-flavida.	subsimplex.	,,	arcuata.	28 | 30	12	14 | 15	W. Mexico.
filosa, *Pfr*	ovato-oblonga.	confertim costulata.	rubello-cornea.	crenulata, marginat a.	acutiuscula.	vix arcuata.	34	14	16½	E. Mexico.
fischeri, *v. Mart.*	fusiformi-oblonga.	leviter plicata.	fusca.	subsimplex.	obesa.	arcuata.	37	15	18	Centr. Mexico.
sulcifera, *v. Mart.*	ovato-oblonga.	latiuscule rugata.	griseo-carnea, nitida.	irregulariter crenulata, albescens.	,,	,,	32	13	17	W. Mexico.
albersi, *Pfr.*	oblongo-ovata.	subinæqualiter striatula.	pallide carneo-flavida, nitidula.	levissime crenulata.	sat obesa.	subrecta.	30 | 33	14 | 15	16½ | 17	N.W. Mexico.
——,var. inflata,*v. Mart.*	ovata.	,,	,,	,,	,,	paullum arcuata.	27½	13	11	N.W. Mexico.
mitriformis, *Ang.*	oblongo-ovata.	striatula.	castanea.	simplex, pallide flava.	brevis, obtusa.	subrecta.	29	14	15½	Costa Rica.
monilifera, *Pfr.*	attenuata, oblongo-ovata.	leviter costulata, nitida.	fulvo-rosea, varicibus fuscis.	leviter marginata, granulosa, concolor.	sat obesa.	,,	29 | 28	14½ | 12½	15	S.W.Mex.,Chiapas, N. Guat.
——, var. pulcherrima, *Streb.*	,,	,,	flava, varicibus pallidis.	leviter marginata, granulosa, alba.	modice attenuata.	arcuata.	30 | 28	14 | 12	15 | 14½	E. Mexico.
obtusa, *Pfr.*	ovata.	leviter striatula, nitida.	carneo-flavida.	leviter marginata.	sat obesa.	subrecta.	18	8½	9	Nicaragua.
stigmatica, *Shuttl.*	fusiformis.	sublævis, nitida.	flava, varicibus fuscis.	anguste marginata.	modice attenuata.	paullum arcuata, oblique truncata.	15	7	9	E. Mexico.
nana, *Shuttl.*	ovata.	confertim costulata.	roseo-fulva, opaca, ad suturam pallida.	simplex.	brevis, obtusa.	paullum arcuata.	13 | 10	6½ | 6	8 | 6½	E. Mexico.
difficilis, *Crosse & Fisch.*	fusiformi-turrita.	striata.	isabellina.	subsimplex.	elongato-conica.	contorta.	20	9	9	Mexico.
truncata, *Gm.*	ovato-oblonga.	confertim costulata.	griseo-rosea.	crenulata.	obtusa.	leviter arcuata.	50 | 65	22 | 26	29 | 32	Southern United States.
——, var. parallela	subcylindrica.	,,	,,	,,	,,	,,	55	21	28	Southern U. S.
——, var. bullata.....	subovata.	,,	,,	,,	,,	,,	40	19	26	Southern U. S.
striata, *Müll.*	turrito-fusiformis.	plicato-costulata.	pallide flavidula, strigis fuscis solitariis.	distincte marginata et granulata.	valde attenuata.	subrecta vel paullum arcuata.	56	23	30	Colombia,Ecuador, &c. (? Mexico).
plicatula, *Pfr.*	subventricoso-fusiformis.	confertim plicatula, subtiliter decussata.	rufo-fusca, nitida.	crenulata, marginata.	attenuata.	arcuata.	75 | 60	31 | 25	37 | 31	Colombia, Venezuela.
attenuata, *Pfr.*	anguste cylindrica.	lævis.	flava, nitida.	simplex, albida.	obesa.	valde arcuata.	33	11	18	?? Central Am.

A. *Plexæ.*

1. **Glandina indusiata.** (Tab. II. figg. 1, 1 *a*.)

Oleacina indusiata, Pfr. P. Z. S. 1860, p. 138[1]; Malak. Blätt. viii. p. 79 (1861)[2]; Monogr. Helic. Vivent. vi. p. 284[3].

Glandina indusiata (Pfr.), Fischer & Crosse, Miss. Scient. Mex., Mollusca, i. p. 121, t. 6. fig. 1[4].

Glandina truncata, var., Strebel, Beitr. Mex. Land- und Süssw.-Conch. ii. p. 6, t. 3. fig. 3 *e*[5].

Hab. Central Mexico: Angangueo in Michoacan, a young specimen (*Deppe*[5]).

S. Mexico: La Parada in Oaxaca (*Sallé*[1 4]), Oaxaca (*Höge*).

Easily recognizable by its ventricose form and comparatively very feeble sculpture. The relative width of the last whorl is somewhat variable, as will be seen by comparing the two figures.

2. **Glandina vanuxemi.** (Tab. II. figg. 2 *a*, 2 *b*, 2 *c*.)

Achatina vanuxemensis, Lea, Trans. Am. Phil. Soc. v. p. 84, t. 19. fig. 78 (1832)[1]; Pfr. Monogr. Helic. Vivent. ii. p. 294[2]; Reeve, Conch. Icon. vi., *Achatina,* t. 13. fig. 48[3].

Achatina (*Glandina*) *vanuxemensis* (Lea), Pfr. Symb. Hist. Helic. iii. p. 91[4].

Glandina vanuxemensis (Lea), Albers, Die Helic. p. 198[5]; Binney, Terr. air-breathing Moll. U.S. ii. p. 299, t. 62. fig. 1[6]; Binney & Bland, Land and Freshw. Shells of N. Am. i. p. 15, fig. 4[7]; Binney, Man. of Am. Land-Shells, p. 347[8].

Oleacina vanuxemensis (Lea), Gray, Cat. Pulm. p. 36[9]; Pfr. Monogr. Helic. Vivent. iv. p. 643[10].

Glandina vanuxemii, Tryon, Amer. Journ. Conch. ii. p. 226, t. 16. fig. 6[11]; Fischer & Crosse, Miss. Scient. Mex., Mollusca, i. p. 100[12]; Strebel, Beitr. Mex. Land- und Süssw.-Conch. ii. p. 14[13].

Achatina coronata, Pfr. in Zeitschr. für Malak. 1846, p. 158[14]; Monogr. Helic. Vivent. ii. p. 293[15]; Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, *Achatina,* no. 77, p. 344, t. 38. figg. 1, 2[16].

Glandina coronata (Pfr.), Albers, Die Helic. p. 198[17]; v. Mart. in Malak. Blätt. xii. p. 10 (1865)[18]; Fischer & Crosse, Miss. Scient. Mex., Mollusca, i. p. 101[19]; Strebel, Beitr. Mex. Land- und Süssw.-Conch. ii. pp. 13, 14, t. 3. figg. 9, 9 *a*, *b*[20]; iii. pp. 7, 45 (anat.), & t. 11. fig. 3 (radula)[21].

Oleacina coronata (Pfr.), Gray, Cat. Pulm. p. 33[22]; Pfr. Monogr. Helic. Vivent. iv. p. 642[23], & vi. p. 282[24].

Hab. Central Mexico: Volcan de Mexicalcingo 400 to 500 feet above the plateau (*Deppe & Schiede*[18]); Cuernavaca, Tehuacan (*Höge*); Mexico, without nearer indication of locality (*Vanuxem*[1–4], *Liebmann*[14 15 16]).

S.W. & S. Mexico: Omilteme in Guerrero (*H. H. Smith*); Oaxaca (*Höge*); Juquila, west of Oaxaca[24].

The Omilteme examples have the spire somewhat more slender and the coloration darker; they reach the large size of long. 100, diam. 42, apert. 58 millim., and show in younger specimens the peculiar coloration of small whitish spots and dark brown short spiral lines in front of them very distinctly.

The species is said to occur also in Texas[6 7 8 11].

The spelling "*vanuxemensis*" is incorrect, the species having been named in honour of Prof. Vanuxem, not from a locality.

Most authors have retained *G. coronata* and *G. vanuxemi* as distinct species; but Pfeiffer, myself, and Strebel had no specimen of *G. vanuxemi*, and the American authors not one of *G. coronata*, for direct comparison. Fischer and Crosse do not appear to have had any additional materials for judging them: they give the absence of white spots in *G. coronata* and that of brown lines in *G. vanuxemi* as distinctive characters. But the Berlin Museum has specimens in which both are very distinctly combined, and Binney's figure [6 7] shows very distinctly the brown lines also in *G. vanuxemi*.

Var. *guttata*.

Glandina guttata, Crosse & Fischer, in Journ. de Conch. xvii. p. 250 (1869) [1]; Fischer & Crosse, Miss. Scient. Mex., Mollusca, i. p. 102, t. 3. figg. 3, 3 *a* [2].

Oleacina guttata (Cr. & Fisch.), Pfr. Monogr. Helic. Vivent. viii. p. 330 [3].

Hab. CENTRAL MEXICO: near Puebla, rare (*Boucard* [1 2 3]).

3. **Glandina sowerbyana.** (Tab. II. figg. 3, 3 *a*, 3 *b*, 3 *c*.)

Achatina (*Glandina*) *sowerbyana*, Pfr. P. Z. S. 1846, p. 32 [1].

Achatina sowerbyana, Pfr. Monogr. Helic. Vivent. ii. p. 292 [2]; Reeve, Conch. Icon. vi., *Achatina*, t. 8. fig. 26 [3].

Glandina sowerbyana (Pfr.), Albers, Die Helic. p. 198 (1850) [4]; Fischer & Crosse, Miss. Scient. Mex., Mollusca, i. p. 98 [5]; Strebel, Beitr. Mex. Land- und Süssw.-Conch. ii. pp. 14–16 (Forms A & B), t. 5. figg. 10, 10 *a–o* [6]; iii. pp. 7, 34, 50, tabb. 15–20 (observations on the living animal); Jousseaume, Bull. Soc. Zool. Fr. iii. p. 169 (1878) [7]; Angas, P. Z. S. 1879, p. 480 [8].

Oleacina sowerbyana (Pfr.), Gray, Cat. Pulm. p. 33 [9]; Pfr. Monogr. Helic. Vivent. iv. p. 642 [10].

Glandina lignaria (Reeve), Fischer & Crosse, Miss. Scient. Mex., Mollusca, i. p. 97, t. 3. fig. 1 [11]; Angas, P. Z. S. 1879, p. 479 [12].

Hab. E. MEXICO: Misantla, San José, San Juan Miahuatlan, and Pacho, near Jalapa (*Strebel*); Jalapa (*Höge*); Mirador, State of Vera Cruz 2630 feet above the sea (*Strebel*); Cerro Necoxtla between Jalapa and Orizaba 3000 to 5000 feet (*Botteri* [6]); Orizaba (*Botteri* [11]).

S.W. & S. MEXICO: Omilteme, State of Guerrero (*H. H. Smith*); Totontepec, State of Oaxaca [2] (*coll. Cuming* [1 4])

N. GUATEMALA: Vera Paz (*Boucard* [7]).

CENTRAL GUATEMALA: Guatemala city (*Champion*).

E. & W. COSTA RICA: only in elevated districts, as high as 6000 feet (*Gabb* [8 12]); Rio Jesus Maria (*coll. Seebach*); Caché (*Rogers*); San José (*Koschny*: figg. 10, *m–o* [6]; and *Biolley*).

PANAMA: Chiriqui (*Ammon* [6]); Volcan de Chiriqui 3000 feet above the sea (*Champion*).

Var. *estefaniæ*: minor, gracilior.

Glandina sowerbyana, Form D, Strebel, Beitr. Land- und Süssw.-Conch. ii. p. 17, tabb. 5 & 5 *a*, fig. 11 [13].

Glandina estefaniæ, Strebel, l. c. iii. pp. 7, 45 [14].

Hab. E. Mexico: Miahuatlan, between Jalapa and Misantla (*Strebel* [13] [14]).

The different variations in shape and size are well figured by Strebel (*loc. cit.*). Younger specimens are distinctly more fusiform (fig. 3); but in the adult ones the general form is variable, being more decidedly saccate, *i. e.* inflated below, if the suture is more strongly descending near the aperture. I cannot find trustworthy differences between the Mexican and the more southern specimens.

4. **Glandina coulteri.** (Tab. II. figg. 4, 4 *a*, 4 *b*, 4 *c*.)

Glandina coulteri (Gray), Beck, Index Moll. p. 78, without description (1837) [1].

Oleacina coulteri (Gray), Pfr. Monogr. Helic. Vivent. p. 642 (1859) [2].

Glandina uhdeana, v. Mart. in Monatsb. d. Akad. Berl. 1863, p. 540 [3]; Malak. Blätt. xii. p. 10, t. 1. fig. 1 (1865) [4]; Fischer & Crosse, Miss. Scient. Mex., Mollusca, i. p. 94 [5]; Strebel, Beitr. Mex. Land- und Süssw.-Conch. ii. p. 11, t. 4. fig. 6, & iii. p. 7 [6].

Oleacina uhdeana, Pfr. Monogr. Helic. Vivent. v. p. 282 [7].

Hab. Central Mexico: Zimapan, forty leagues north of Mexico (*Rev. D. Davison*); Puebla (*Berkenbusch*).

E. Mexico: State of Vera Cruz (*Uhde* [3] [7]); Jalapa (*H. H. Smith*).

In my original description [3] [4] "apert. long. 47" is a misprint for 37 millim., as is clearly shown by the figure; the diameter $25\frac{1}{2}$ is measured immediately above the upper end of the aperture, while in our table the diameter is measured on the most ventricose part of the last whorl. The specimen obtained by Mr. H. H. Smith (fig. 4 *a*) is considerably larger than the type, and somewhat more rudely and unequally striated; in other respects they are much alike. A still larger specimen from Zimapan, presented to Mr. Abraham Lincoln by Rev. D. Davison, is now in Peel Park Museum; I am indebted to Mr. Sowerby for a coloured drawing of it (fig. 4).

5. **Glandina cuneus,** sp. n. (Tab. III. figg. 1, 1 *a–c*, 2, 2 *a*.)

Testa conoideo-oblonga, anguste saccata, costulis confertis et lineis impressis spiralibus sat distantibus sculpta, fulvo-fusca, nitidula, tenuis; anfr. 6–$6\frac{1}{2}$, spira sat obesa, apice ipso obtusa, sutura distincte obliqua, leviter crenulata; apertura lanceolata, dimidiam longitudinem plus minusve superans, margine columellari arcuato. (*a*) Long. 49, diam. 19, apert. long. 29, diam. 12 millim.; (*b*) Long. 51, diam. 19, apert. long. 27, diam. $12\frac{1}{2}$ millim.

Hab. S.W. Mexico: Omilteme, State of Guerrero (*H. H. Smith*).

I have figured two specimens (figg. 1, 2) because they exhibit remarkable differences in the relative size of the visible part of the upper whorls, the degree of obliquity in the suture, and the breadth of the aperture, the one being somewhat more involute than the other. In all other respects their specific qualities are the same. This is an interesting example of the individual variation in the genus *Glandina*, which renders the precise distinction of species so difficult and uncertain.

6. Glandina aurata.

Glandina aurata, Morelet, Test. Noviss. i. p. 12 (1849) [1]; Fischer & Crosse, Miss. Scient. Mex., Mollusca, i. p. 106, t. 3. figg. 7, 7 *a* [2]; Angas, P. Z. S. 1879, p. 480, t. 40. fig. 6 (anim.) [3]; Jousseaume, Bull. Soc. Zool. Fr. iii. p. 169 (1878) [4].

Achatina (*Glandina*) *aurata* (Morelet), Pfr. Monogr. Helic. Vivent. iii. p. 517 [5].

Oleacina aurata (Morelet), Gray, Cat. Pulm. p. 33 [6]; Pfr. Monogr. Helic. Vivent. iv. p. 642 [7].

Achatina lignaria, Reeve, Conch. Icon. vi., *Achatina*, t. 8. fig. 27 [8]; Pfr. Monogr. Helic. Vivent. iii. p. 519 [9].

Oleacina lignaria (Reeve), Gray, Cat. Pulm. p. 34 [10]; Pfr. Monogr. Helic. Vivent. iv. p. 642 [11].

Glandina lignaria (Reeve), H. & A. Adams, Gen. Moll. ii. p. 108 [12]; v. Mart. P. Z. S. 1875, p. 647 [13].

Glandina sowerbyana, Form C, Strebel, Beitr. Mex. Land- und Süssw.-Conch. ii. p. 17, t. 6 *a*. figg. 12, 12 *a–f* [14].

Glandina, sp., Binney, Ann. N. Y. Acad. i. p. 261 (1879) [15]; iii. p. 81, t. 17. fig. E (1884) (radula) [16].

Hab. N. Guatemala: Woods of Vera Paz (*Morelet* [1]); Alta Vera Paz (*Bocourt* [2]); Vera Paz [5 6] (*Boucard* [4]); Coban (*Salvin* [13]).

Central Guatemala: Mountain forest between Tepan and Totonicapam 8000 to 9000 feet above the sea (*Stoll*).

S.E. Costa Rica (*Gabb* [3 15 16]).

Strebel's *G. aurata* (op. cit. ii. p. 21, t. 12. figg. 36, 36 *a*, *b*), from Ocaña, Colombia, belongs, I believe, to another species, distinct by the more turrite-cylindrical form, the shorter aperture, the want of the numerous dark brown stripes, and a somewhat weaker sculpture; a specimen collected by Herr Alf. Stübel in the Llanos of San Martin appears to be referable to the same species, for which I propose the name *G. stübeli*.

The locality for Reeve's specimen of *A. lignaria* was unknown [8].

B. *Marginatæ*.

7. Glandina fusiformis.

Achatina fusiformis, Pfr. P. Z. S. 1845, p. 75 [1]; Monogr. Helic. Vivent. ii. p. 292 [2]; Reeve, Conch. Icon. vi., *Achatina*, t. 9. fig. 31 [3]; Deshayes, in Férussac's Hist. Nat. Moll. Terr. ii. p. 181, t. 137. figg. 1–3 [4].

Glandina fusiformis, Morelet, Journ. de Conch. iii. p. 33 (1852) [5]; Fischer & Crosse, Miss. Scient. Mex., Mollusca, i. p. 103, t. 3. fig. 2 *a* [6]; Strebel, Beitr. Mex. Land- und Süssw.-Conch. ii. p. 26, t. 9. figg. 14, 14 *a* [7]; v. Mart. P. Z. S. 1875, p. 647 [8]; Jousseaume, Bull. Soc. Zool. Fr. iii. p. 169 (1878) [9].

Oleacina fusiformis (Pfr.), Gray, Cat. Pulm. p. 32 [10]; Pfr. Monogr. Helic. Vivent. iv. p. 642 [11].

Var. *miltochila*: anfr. ultimis stramineis, peristomate miniaceo.

Achatina fusiformis, Reeve, loc. cit. fig. 31 *b*.

Glandina fusiformis, var. *β*, Fischer & Crosse, loc. cit. p. 104, t. 3. fig. 2.

Hab. N. Guatemala: Coban, dep. Vera Paz [3 10] (*coll. Cuming* [1]; *Delattre* [2–6], *Salvin* [8], *Sarg* [7]); Alta Vera Paz (*Bocourt* [6], *Boucard* [9]); Purula, upper part of the Polochic Valley (*Champion*).

Central Guatemala: Guatemala city (*Champion*).

Rather variable in the relations of length and diameter, in the proportion of the last whorl to the whole length, in the size of full-grown specimens, and also in the presence or want of a light rounded angulation in the upper part of the last whorl.

The var. β shows in the upper whorls no difference from the type; but the lower whorls are pale yellow instead of reddish-orange (without periostracum white), and the aperture is bordered by a narrow band of bright red. It is chiefly found at Coban, with the type.

G. binneyana (Pfr. *op. cit.* iv. p. 638), Fischer and Crosse (*op. cit.* p. 93), and Strebel (*op. cit.* p. 27), probably belongs to the same species. Pfeiffer's description and measurements agree well with a middle-sized specimen from Coban; he gives no locality, but Fischer and Crosse state that a specimen has been found by Mr. O. Salvin in Vera Paz. I have examined this specimen: it is very worn and belongs no doubt to *A. fusiformis*. The author's description, "parum nitens, carnea," is very applicable to a somewhat worn example, in which the colour has become more reddish. The spiral lines, which are very fine in well-preserved specimens, having disappeared wholly in worn ones, Dr. Pfeiffer has placed his *G.* (*Oleacina*) *binneyana* in another division "§ 5, longitudinaliter striatæ vel costulatæ," far from *G. fusiformis*, which is in "§ 6, decussatæ"; Strebel is the first who has recognized its close resemblance to *G. fusiformis*.

The measurements of not quite full-grown specimens are:—

Long. 70, diam. 31, apert. 45 millim.
„ 68, „ 29½, „ 40 „

8. Glandina ghiesbreghti.

Achatina (*Oleacina*) *ghiesbreghti*, Pfr. P. Z. S. 1856, p. 379 [1].
Oleacina ghiesbreghti, Pfr. Malak. Blätt. iii. p. 235 (1850) [2]; Monogr. Helic. Vivent. iv. p. 644 [3].
Glandina ghiesbreghti (Pfr.), v. Mart. in Albers's Die Helic. ed. 2, p. 26 [4]; Strebel, Beitr. Mex. Land- und Süssw.-Conch. ii. p. 39, t. 10. figg. 31 *a–e* [5].

Hab. Chiapas (*Ghiesbreght* [1–5]).

Very distinct by the angular swelling in the upper part of the last whorl, and its considerable attenuation below. Rather solid.

9. Glandina decussata.

Achatina decussata, Deshayes, in Férussac's Hist. Nat. Moll. Terr. ii. p. 182, t. 123. figg. 3, 4, & t. 134. figg. 33–35 [1]; Pfr. Monogr. Helic. Vivent. iii. p. 519 [2].
Glandina decussata (Desh.), Morelet, in Journ. de Conch. iii. p. 136 [3]; Fischer & Crosse, Miss. Scient. Mex., Mollusca, i. p. 112 (part.) [4]; Strebel, Beitr. Mex. Land- und Süssw.-Conch. ii. p. 34, t. 10. figg. 22, 22 *a–f* [5].

Oleacina decussata (Desh.), Gray, Cat. Pulm. p. 37 [6]; Pfr. Monogr. Helic. Vivent. iv. p. 644 [7].
Glandina ghiesbreghti, Tristr. P. Z. S. 1861, p. 230 [8]; Fischer & Crosse, Miss. Scient. Mex., Mollusca, i. p. 105 (part.) [9].

Hab. N. Guatemala: Alta Vera Paz (*Bocourt* [4]); Coban (*Sarg*); Senahu and Panzos, in the upper part of the Polochic valley (*Champion, Conradt*); Guatemala (*Salvin* [8]).

Having before me Tristram's specimens of *G. ghiesbreghti* [8], collected by Mr. O. Salvin, I can state that it is not the *G. ghiesbreghti* of the German authors, but *G. decussata*; and Fischer and Crosse's *G. ghiesbreghti* is probably the same species, as they say, "le dernier tour est arrondi et nullement subanguleux."

A nearly allied form from Mirador, Vera Cruz, is noticed under the name of *G. decussata*, var., by Strebel, *op. cit.* p. 35, t. 10. figg. 22 *g*–22 *i*; but in his figures the pillar-lip does not show the usual characteristic shape, and I hesitate to include this form in *G. decussata*. Perhaps it may be the full-grown state of the following species.

10. **Glandina tenella.**

Glandina ghiesbreghti, var. *β,* Fischer & Crosse, Miss. Scient. Mex., Mollusca, i. p. 105, t. 3. figg. 6, 6 *a* [1].
Glandina tenella, Strebel, Beitr. Mex. Land- und Süssw.-Conch. ii. p. 35, t. 10. figg. 24, 24 *a–d* [2].

Hab. E. Mexico: Vera Cruz, in the so-called "Callejones" (galleries) in the first woods, ½–1 hour from the city, on shrubs (*Strebel* [2]); near Vera Cruz (*Höge*).
S. Mexico (*Sallé* [1]).

Strebel's and Fischer and Crosse's specimens seem to be not quite full-grown.

11. **Glandina cumingi.** (Tab. IV. fig. 7, var.)

Glandina cumingii, Beck, Index Moll. p. 78 (1837), (*a,* lutea; *b,* fulvescens; *c,* rufo-rosea) [1].
Glandina petiti (Desh.), Strebel, Beitr. Mex. Land- und Süssw.-Conch. ii. pp. 40–43 [2].

a: *fulvo-rosea.*

Achatina rosea (Fér., Gray), Pfr. Monogr. Helic. Vivent. ii. p. 294 (part.) [3]; Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, *Achatina,* no. 55, p. 330, t. 27. figg. 6, 7 [4].
Glandina rosea (Fér.), Pfr. in Philippi's Abbild. i. p. 133, t. 1. fig. 1 [5]; Albers, Die Helic. p. 198 (1850) [6], & ed. 2, pp. 26, 28 [7]; H. & A. Adams, Gen. Moll. ii. p. 108, t. 71. fig. 2 *a* [8]; Tate, in Am. Journ. Conch. v. p. 158 (1870) [9]; Fischer & Crosse, Miss. Scient. Mex., Mollusca, i. p. 107 (part.) [10]; Strebel, Beitr. Mex. Land- und Süssw.-Conch. ii. p. 42, t. 8. figg. 28, 28 *a, b,* t. 12. figg. 27 *f–h,* & figg. 28 *f–h* [11]; Binney & Bland, in Am. Journ. Conch. vi. p. 202, fig. 1 (radula) [12]; Ann. N. Y. Acad. iii. p. 81, t. 17. fig. B (radula) [13].

b: *flavida.* (Fig. 7.)

Achatina rosea, var. *β,* Pfr. Monogr. Helic. Vivent. ii. p. 294 [14].
Achatina petiti, Deshayes, in Férussac's Hist. Nat. Moll. Terr. ii. p. 175, t. 122. figg. 12–14

(about 1850) [15]; Morelet, Journ. de Conch. iii. p. 42, t. 1. fig. 5 [16]; Pfr. Monogr. Helic. Vivent. iii. p. 518 [17].

Glandina petiti (Desh.), Morelet, in Journ. de Conch. iii. p. 37 [18]; v. Mart. in Albers's Die Helic. ed. 2, pp. 26, 28 [19]; Strebel, Beitr. Mex. Land- und Süssw.-Conch. ii. t. 8. figg. 27, 27 *a–e*, t. 13. figg. 27 *i*, 28 *i* [20].

Oleacina petiti, Gray, Cat. Pulm. p. 36 [21]; Pfr. Monogr. Helic. Vivent. iv. p. 643 [22].

c: *rubromarginata*.

Achatina rosea, var. γ, Pfr. Monogr. Helic. Vivent. ii. p. 294 [23].

Glandina petiti, Form B, Strebel, Beitr. Mex. Land- und Süssw.-Conch. ii. p. 43, t. 8. figg. 29, 29 *a*, *b* [24].

Hab. S.E. Mexico: Teapa, State of Tabasco (*H. H. Smith*; Forms *a* and *b*); Mexico, without precise locality (*Höge*).

N. Guatemala: Chacoj in the Polochic Valley (*Champion*; Form *b*).

S. Guatemala: Retalhuleu in the Costa Grande, 710 feet above the sea (*Stoll*; Form *b*); El Reposo 800 feet (*Champion*; Form *b*); Hacienda de San Francisco Miramar, Costa Cuca 2500 feet, and Cholluitz on the slope of the Volcan de Santa Maria, 2000 feet (*Stoll*; Form *a*).

Honduras (*Dyson* [23]; Form *c*).

Nicaragua (*McNiel* [13], *Bland* [10], *Janson*, *Berendt* [11]; Form *a*); on the north of the Lake (*Deshayes* [15]; Form *b*); throughout the savana region, under the leaves of *Bromelia pinguis*, at Granada on the N.W. side of the Lake, Mesapa, San Ubaldo, &c. (*Tate* [9]; Form *a*); vicinity of Lake Nicaragua [17] [21].

Costa Rica: San José (*Koschny* [24]; Form *c*).

Panama (*Paz* [10]).

This species is also quoted from Mexico by some authors, but without nearer indication of locality or collector: Fischer and Crosse are probably right in limiting this statement to the southernmost provinces.

By Pfeiffer and Fischer and Crosse, a length of 60 millim. is given to this species, according to the figures in Férussac (t. 136. figg. 8, 9) and Reeve (fig. 46 *a*); but I have never seen a specimen so large in size.

Helix rosea, Férussac (Prodrom. no. 356), is, according to the locality (Florida) and two of the three synonyms, conspecific with the North-American *G. truncata* (Gmel.), which is represented by the figures left by Férussac on t. 135. fig. 3.

G. alabastrina [Albers, in Malak. Blätt. i. p. 220 (1852); Pfr. Novitat. i. p. 43, t. 11. figg. 5, 6 (*Achatina*); Monogr. Helic. Vivent. iv. p. 638 and vi. p. 278 (*Oleacina*); Fischer & Crosse, Miss. Scient. Mex., Mollusca, i. p. 120; and Strebel, Beitr. Mex. Land- und Süssw.-Conch. ii. p. 38, t. 9*a*. figg. 32, 32 *a*, *b*], based on one specimen, from Central America, long. 31, diam. 22, apert. 23 millim., is probably an unusually large and solid, but quite discoloured specimen of *G. cumingi*. Another specimen, from Tabasco [Pfr. Monogr. Helic. Vivent. vi. p. 278: Strebel, *op. cit.* p. 39, t. 9. figg. 32 *c*–32 *e*], and

Strebel's *G. alabastrina*, Form B [*op. cit.* p. 39, t. 9. figg. 32 *f*–32 *h*], most likely also belong to the same species. An allied form is found in Texas; it is *G. corneola*, Binney, Terr. Moll. of N. Am. iv. p. 139 (1859) [= *G. truncata*, var., Binney, *op. cit.* iii. p. 302, t. 61. fig. 1; *G. decussata*, Binney, Land and Freshw. Shells of N. Am. i. p. 18, fig. 8, and Tryon, in Am. Journ. Conch. ii. p. 227, t. 16. fig. 7; *Oleacina corneola*, Pfr. Monogr. Helic. Vivent. vi. p. 283]. In Tryon's figure (all three are copies of the same drawing) the characteristic form of the pillar-lip is wanting; I have seen no specimens from this locality.

12. **Glandina carmenensis.**

Glandina carminensis, Morelet, Test. Noviss. i. p. 15 (1849) [1]; Journ. de Conch. iii. pp. 36, 42, t. 1. figg. 1–4 (living animal) [2] (copied in H. & A. Adams, Gen. Moll. t. 71. fig. 2); Tristr. P. Z. S. 1861, p. 230 [3] *; Jousseaume, Bull. Soc. Zool. Fr. iii. p. 169 (1878) [4].

Glandina carmenensis, Fischer & Crosse, Miss. Scient. Mex., Mollusca, i. p. 109 [5]; Strebel, Beitr. Mex. Land- und Süssw.-Conch. ii. p. 37, t. 9. figg. 23, 23 *a–d*, *h*, *i* (Form A) [6]; Ancey, Annal. de Malac. ii. p. 257 (1886) [7].

Achatina carminensis, Deshayes, in Férussac's Hist. Nat. Moll. Terr. t. 137. figg. 11, 12 [8]; Reeve, Conch. Icon. vi., *Achatina*, t. 13. fig. 46 *b* (*A. rosea*) [9].

Oleacina carminensis, Gray, Cat. Pulm. p. 36 [10]; Pfr. Monogr. Helic. Vivent. iv. p. 644 [11].

Hab. YUCATAN: Island of Carmen [10], in the Bay of Terminos, Gulf of Campeche, on sandy soil (*Morelet* [1 2 5]).

S. GUATEMALA: Cerro Zunil, near Quezaltenango (*Champion*); Guatemala (*Salvin* [3], *Boucard* [4]).

HONDURAS: Island of Utila, Bay of Honduras (*Simpson* [7]).

Intermediate between *G. decussata* and *G. petiti*; distinct from the former by the straight pillar-lip, and from the latter by the more slender form; some specimens, however, do not show these characters so clearly.

According to M. L. de Folin (Fischer & Crosse, *op. cit.* p. 110 [5]), a yellow-coloured variety lives together with the type on the same islet, Carmen; see also Férussac, *op. cit.* figg. 11, 12. Pfeiffer [11] gives the habitat "Mexico (*Sallé*)."

C. *Turritæ*.

13. **Glandina liebmanni.** (Tab. III. figg. 3, 4.)

Achatina liebmanni, Pfr. in Zeitschr. für Malak. 1846, p. 159 [1]; Monogr. Helic. Vivent. ii. p. 293 [2]; Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, *Achatina*, p. 294, t. 23. figg. 4, 5 [3].

Glandina liebmanni (Pfr.), Albers, Die Helic. p. 198 (1850) [4]; v. Mart. in Malak. Blätt. xii. p. 11 (1865) [5]; Fischer & Crosse, Miss. Scient. Mex., Mollusca, i. p. 119 [6]; Strebel, Beitr. Mex. Land- und Süssw.-Conch. pp. 9–11, t. 4. figg. 5, 5 *a–f* [7]; iii. pp. 7, 46, t. 12. fig. 2 [8].

* Tristram [3] erroneously states that this shell was "described by Morelet from Costa Rica."

Oleacina liebmanni (Pfr.), Gray, Cat. Pulm. p. 34[9]; Pfr. Monogr. Helic. Vivent. iv. p. 643[10].
Achatina striata, Reeve, Conch. Icon. vi., *Achatina*, t. 6. fig. 19 (nec Müller)[11].

Hab. CENTRAL MEXICO: near the city of Mexico (*Hahn*[7]); Mexico, without nearer indication of locality[9 11] (*Liebmann*[1 2 3 6], *Uhde*[5], *Höge*).
S.W. MEXICO: Chilpancingo, State of Guerrero (*H. H. Smith*).

Var. *insignis*.
Achatina insignis, Pfr. P. Z. S. 1855, p. 100, t. 31. figg. 11, 12[12]; Novit. Conch. i. p. 63, t. 18. figg. 3, 4[13].
Oleacina insignis, Pfr. Monogr. Helic. Vivent. iv. p. 643[14].
Glandina insignis, Fischer & Crosse, Miss. Scient. Mex., Mollusca, i. p. 110, t. 6. figg. 2, 2 *a*[15]; Strebel, Beitr. Mex. Land- und Süssw.-Conch. ii. p. 11[16].

Hab. N.W. MEXICO: San Blas, State of Jalisco[15 16]; Tepic (*Richardson*).

Pfeiffer[12–14] did not know the habitat of the form *insignis*. A nearly allied, but more ventricose form, 67, 29, 31 millim., the locality of which is unknown, is represented by Chemnitz (*Buccinum striatum*, part.), Conch. Cab. ix. t. 120, figg. 1028, 1029 (copied in ed. 2, *Achatina*, t. 3. figg. 3, 4, under the name of *A. liebmanni*); it approaches the above-quoted figure of Reeve[11].

G. cognata, Strebel, Beitr. Mex. Land- und Süssw.-Conch. ii. p. 12, t. 4. fig. 7 (Pfr. Monogr. Helic. Vivent. viii. p. 332), from Tehuantepec, seems to be intermediate between *G. liebmanni* and *G. audebardi*, having the more broad and solid shell of the former, but the weak sculpture of the latter. *G. radula*, Strebel, *loc. cit.* p. 13, t. 3. fig. 8 (Pfr. Monogr. Helic. Vivent. viii. p. 333), also from Tehuantepec, may be a dwarf form of *G. liebmanni*.

Achatina marminii, Deshayes, in Guérin's Mag. Zool. 1831, t. 19 (copied in Martini & Chemnitz, ed. 2, *Achatina*, t. 3. fig. 2; Pfr. Monogr. Helic. Vivent. ii. p. 288), locality unknown, is possibly a not full-grown specimen of *G. liebmanni*.

G. nympha, Fischer & Crosse, Miss. Scient. Mex., Mollusca, i. p. 115, t. 6. fig. 9 "Mexico (*Sallé*)," without nearer indication of locality, is founded on a large bleached specimen (long. 60, diam. $23\frac{1}{2}$, apert. 29 millim.) which bears a considerable resemblance to *G. liebmanni*, only its columella seems to be more arcuate.

14. **Glandina audebardi.** (Tab. III. figg. 5–8.)

Glandina audebardi (Deshayes), Strebel, Beitr. Mex. Land- und Süssw.-Conch. ii. pp. 30–33[1].

a. *typica*. (Figg. 5, 5 *a*, 6, 6 *a*.)

Helix rosea, var. *elongata*, Férussac, Prodr. no. 356[2]; Hist. Nat. Moll. Terr. t. 135. figg. 1, 2 (about 1829)[3].
Achatina daudebarti, Deshayes, in Férussac's Hist. Nat. Moll. Terr. ii. p. 183 (about 1850)[4]; Pfr. Monogr. Helic. Vivent. iii. p. 519[5].
Glandina daudebarti (Deshayes), Morelet, Journ. de Conch. iii. p. 36[6].

Glandina audebardi (Deshayes, emend.), Fischer & Crosse, Miss. Scient. Mex., Mollusca, i. p. 118[7]; Strebel, loc. cit. ii. t. 11. figg. 19 *c*, *d*[8].
Oleacina daudebarti, Gray, Cat. Pulm. p. 37[9]; Pfr. Monogr. Helic. Vivent. iv. p. 645[10].
Glandina amœna, var. *β pliculosa*, Fischer & Crosse, loc. cit. p. 114[11].

b. *amœna*. (Figg. 7, 7 *a*.)

Glandina amœna, v. Mart. in Malak. Blätt. xii. p. 12, t. 1. figg. 8, 9 (1865)[12]; Fischer & Crosse, loc. cit. p. 114[13]; Strebel, loc. cit. iii. p. 34, t. 11. fig. 4 (radula), & t. 13. fig. 9[14].
Oleacina amœna (v. Mart.), Pfr. Monogr. Helic. Vivent. vi. p. 283[15].
Glandina audebardi, var. *β*, Fischer & Crosse, loc. cit. p. 118[16].
Glandina audebardi, Form A (part.), Strebel, loc. cit. ii. p. 30, t. 11. figg. 19, 19 *a*, *b*, *e–h*, *m*, *n*[17].

c. *miradorensis*.

Glandina audebardi, Form B, Strebel, loc. cit. ii. p. 33, t. 11. figg. 20, 20 *a*, *b*[18].
Glandina miradorensis, Strebel, loc. cit. iii. pp. 7, 33, t. 9. fig. 14 (juv.)[19].

d. *minor*: isabellina, solidula, long. 31 millim. (Fig. 8.)

Hab. Eastern Mexico: Forms *a* and *b*—in the plains of the State of Vera Cruz, on meadows and at the roots of *Agave* in the environs of Vera Cruz (*Strebel* and *Berendt*[8 17]); Form *a*—Chiquihuitl, State of Vera Cruz (*Boucard*[11]); Form *b*—Vera Cruz, Jalapa, and Cordova (*Höge*); Form *c*—in the more elevated regions at Mirador, 2630 feet above the sea (*Strebel* and *Sartorius*[18 19]); and Tejeria (*Höge*).
Central Mexico: Form *a*—Chietla, State of Puebla (*Boucard*[11]); Mexico, on *Yucca filamentosa*, young specimens (*Deppe, in Mus. Berol.*); Mexico, without nearer indication of locality (*Höge*).
S.W. & S. Mexico: Form *a* (fig. 6)—Venta de Zopilote 2800 feet, State of Guerrero (*H. H. Smith*); Form *d*—Tehuantepec (*Höge*).

The statement "America centralis" given by Deshayes[4] is not confirmed by any later observation.

The typical form, *a*, is characterized by a rather long and attenuated spire; form *b*, *amœna*, is similar in the body-whorl, but the spire, and therefore the whole shell, is shorter; form *c*, *miradorensis*, has the shell thin and of a translucent yellowish colour, not whitish as in the forms *a* and *b*; form *d*, *minor*, is the smallest, but has the shell solid, of isabelline colour.

15. Glandina isabellina.

Achatina (*Glandina*) *isabellina*, Pfr. P. Z. S. 1846, p. 32[1]; Monogr. Helic. Vivent. ii. p. 286[2].
Achatina isabellina, Reeve, Conch. Icon. vi., *Achatina*, t. 21. fig. 95[3].
Glandina isabellina (Pfr.), Morelet, in Journ. de Conch. iii. p. 36[4]; Fischer & Crosse, Miss. Scient. Mex., Mollusca, i. p. 138[5].
Oleacina isabellina (Pfr.), Gray, Cat. Pulm. p. 22[6].

Hab. Mexico: found in decayed trunks of trees (*coll. Cuming*[16]).

All the synonymy quoted seems to refer to one specimen, figured by Reeve and probably not full-grown ; long. 26, diam. 10, apert. 13 millim. It somewhat resembles in form *G. simplex*, but differs from it by the rather distinct marginated suture and spiral striæ.

G. isabellina, var., Angas, P. Z. S. 1879, p. 480, from the hills of Costa Rica, not being figured, remains somewhat doubtful.

G. isabellina (Pfr.), Strebel, Beitr. Mex. Land- und Süssw.-Conch. ii. p. 46, t. 6 *a*. fig. 40, from Colombia, is quite distinct from the *G. isabellina* of Pfeiffer and Reeve.

16. **Glandina longula.** (Tab. III. figg. 9, 9 *a*, 10.)

Glandina longula, Fischer & Crosse, Miss. Scient. Mex., Mollusca, i. p. 111, t. 6. figg. 6, 6 *a* [1] ; Strebel, Beitr. Mex. Land- und Süssw.-Conch. ii. p. 11 [2].

Oleacina (*Glandina*) *longula* (Fischer & Crosse), Pfr. Monogr. Helic. Vivent. viii. p. 333 [3].

Hab. N.E. Mexico: Rio San Juan (*Bland* [1 3]).

Var. *jalapana*. (Figg. 9, 10.) Major, fulva, columella modice arcuata.

Hab. E. Mexico: Misantla and Jalapa (*Höge* ; *F. D. Godman*).

The form *jalapana* may be only a variety of *G. audebardi* ; but it is distinctly more elongate, the sculpture is somewhat stronger, and the colour more intense. The measurements of the three full-grown specimens collected by Herr Höge are:—

(*a*) long. 42, diam. 19½, apert. long. 26 millim. (fig. 9).
(*b*) „ 54, „ 20, „ 25 „ (fig. 10).
(*c*) „ 55, „ 19, „ 26 „

a is from Misantla and approaches the type of *longula* also by its yellowish colour; *b* and *c* are from Jalapa, and are reddish-brown in colour.

17. **Glandina pinicola.**

Glandina plicatula, var. *γ. pinicola*, Fischer & Crosse, Miss. Scient. Mex., Mollusca, i. p. 95, t. 2. fig. 12 [1] ; Strebel, Beitr. Mex. Land- und Süssw.-Conch. ii. p. 20 [2] ; Pfr. Monogr. Helic. Vivent. viii. p. 331, footnote [3].

Hab. Central Guatemala: Totonicapam, in pine-woods (*Bocourt* [1–3]).

The authors regard this form as a variety of *G. plicatula*, Pfr., which lives in Colombia and Venezuela. Considering the measurements and the figure (the diameter of the shell much smaller than half its length, the aperture occupying somewhat more than half the length), I am rather inclined to accept it as a distinct species from that living in South America, of which several specimens are before me, the diameter of these being two thirds of the length, the aperture nearly half the length of the shell ; I have not, however, seen an example of the Guatemalan *G. pinicola*, so am unable to compare the two forms more precisely.

18. **Glandina turris.**

Achatina (*Glandina*) *turris*, Pfr. Symb. Hist. Helic. iii. p. 91 (1846) [1].

Achatina turris, Pfr. Monogr. Helic. Vivent. ii. p. 288 [2]; Reeve, Conch. Icon. vi., *Achatina*, t. 13. fig. 45 [3]; Carpenter, Cat. Mazatlan Shells, p. 175 [4]; Tryon, in Am. Journ. Conch. ii. p. 227, t. 16. fig. 8 [5]; Binney, Land and Freshw. Shells of N. Am. i. p. 19 (1869) [6].

? *Glandina turris*, Strebel, Beitr. Mex. Land- und Süssw.-Conch. iii. p. 46, t. 12. fig. 4 [7].

Hab. N.W. Mexico: Mazatlan [4–7]; Presidio de Mazatlan (*W. Richardson*).

The aperture is comparatively broader below than in most other species of *Glandina*. I have seen no specimen so large as Pfeiffer's typical one (43 millim.), which is probably also that figured by Reeve. Mr. Richardson's example is only 38 millim. long, but it so closely resembles Reeve's figures in its general features that I have no doubt about its identity with *G. turris*, Pfr. Also the measurements given by Carpenter are not so large, long. 1·2 inch = 35 millim.

Concerning the specimen in the Berlin Museum, described and figured by Strebel [7], locality unknown, I am rather doubtful whether it may not be an elongated variety of *G. albersi*.

19. **Glandina mazatlanica,** sp. n. (Tab. IV. figg. 2, 2 *a*, 3.)

Glandina turris, collect.

Testa subcylindrica, solidula, confertim costulato-striata, corneo-fusca; anfr. $6\frac{1}{2}$, convexiusculi, apice obtuso, sutura subangulata, leviter marginata, vix crenulata; apertura dimidiam longitudinem fere attingens, lanceolata, margine externo arcuatim producto; columella subrecta, abrupte truncata. Long. 30–32, diam. $11\frac{1}{2}$–13; apert. long. 15–16, lat. 6–$6\frac{1}{2}$ millim.

Var. *abbreviata*. (Fig. 3.)

Spira abbreviata, anfractu penultimo turgido. Long. 30, diam. 12, apert. 15 millim.

Hab. N.W. Mexico: Mazatlan (*Forrer; mus. Berol.* no. 35386); Tres Marias Is. (*Forrer*);—var., also Tres Marias Is. (*Forrer*).

This species is somewhat intermediate between *G. pseudoturris* and *G. albersi*; the colour and the suture is as in the former, but the form is less elongated.

G. turris of Strebel, Beitr. Mex. Land- und Süssw.-Conch. ii. p. 47, & iii. t. 9. fig. 11, locality unknown, is similar, but somewhat larger and with the aperture proportionately much shorter.

20. **Glandina pseudoturris.** (Tab. IV. figg. 4, 4 *a*.)

Achatina turris, Deshayes, in Férussac's Hist. Nat. Moll. Terr. ii. p. 186, t. 134. figg. 1, 2 [1].

Glandina pseudo-turris, Strebel, Beitr. Mex. Land- und Süssw.-Conch. ii. p. 47, t. 6 *a*. figg. 41, 41 *a*, *b* [2].

Oleacina (*Glandina*) *pseudoturris* (Streb.), Pfr. Monogr. Helic. Vivent. viii. p. 329 [3].

Hab. S.W. & S. Mexico: Tierra Colorada, State of Guerrero (*H. H. Smith*); Juquila, State of Oaxaca [2 3] (*mus. Berol.; Strebel*).

Much smaller and somewhat less elongated than the true *G. turris.* The impressed line immediately below the suture (fig. 4 *a*) is not very distinct and not visible on the upper whorls; but there is an obtuse angulation of the surface immediately below the suture in all whorls except the 2–3 uppermost, which are quite smooth. The colour is a rather dark brownish-fallow.

The example from Guerrero here figured is somewhat larger than Strebel's type specimen from Juquila.

21. **Glandina anomala.**

Glandina (*Oleacina*) *anomala,* Angas, P. Z. S. 1879, p. 481, t. 40. fig. 9 [1].

Hab. S.E. Costa Rica: hilly regions (*Gabb* [1]).

According to the author this is allied to *G. turris,* Pfr., and *G. pseudoturris,* Streb., which is confirmed by the figure. The suture is said to be strongly granulated, which is scarcely to be seen in the figure.

Of course quite distinct from *Oleacina anomala* (Pfr.), H. & A. Adams, Gen. Moll. (*Nothus anomalus,* Albers, Die Helic. p. 169; *Spiraxis anomalus,* Pfr. Monogr. Helic. Vivent. viii. p. 258), which is a Jamaican shell.

22. **Glandina simplex.** (Tab. IV. figg. 5, 5 *a*, 6.)

Glandina turris (Pfr.), v. Mart. in Malak. Blätt. vii. p. 11 (1865) [1].
Glandina simplex, Strebel, Beitr. Mex. Land- und Süssw.-Conch. ii. p. 35, t. 10. figg. 25, 25 *a, b, c* [2].
Oleacina (*Glandina*) *simplex* (Streb.), Pfr. Monogr. Helic. Vivent. viii. p. 323 [3].

Hab. S.W. Mexico; Oaxaca (*Uhde* [1–3]; *mus. Berol.* no. 4241).

Well distinct from *G. turris* by its glossy surface, smaller size, and more slender form, and by the well arcuated columella.

One specimen only known hitherto.

G. candida, Shuttl. in Bern Mittheil. 1852, p. 202 (Diagn. no. 2, p. 22) (*Achatina*) [Pfr. Monogr. Helic. Vivent. iii. p. 512; Gray, Cat. Pulm. p. 25 (*Oleacina*); Fischer & Crosse, Miss. Scient. Mex., Mollusca, i. p. 130], from an examination of the typical specimen (fig. 6), now in the Museum of Berne, seems to be a somewhat smaller, thoroughly bleached example of the same species. Although the name is of anterior date, I prefer not to use it, because it is founded on an accidental deterioration of the specimen.

23. **Glandina conularis.** (Tab. IV. fig. 8.)

Achatina (*Glandina*) *conularis,* Pfr. P. Z. S. 1855, p. 100 [1].
Oleacina conularis, Pfr. Monogr. Helic. Vivent. iv. p. 635 [2].
Glandina conularis (Pfr.), Fischer & Crosse, Miss. Scient. Mex., Mollusca, i. p. 137 [3].

Hab. Mexico (*Sallé* [1–3]).

Type now in the British Museum. Rather near to *G. simplex*, but distinct by the nearly straight columella. I am indebted to Mr. Edgar Smith for furnishing me with a figure of it (fig. 8).

24. **Glandina excavata,** sp. n. (Tab. IV. figg. 9, 9 *a*.)

Glandina albersi (Pfr.), Binney, Land and Freshw. Shells of N. Am. i. p. 18, fig. 9 (not the description) [1].

Testa subcylindrica, confertim striatula, striis in anfractu ultimo levioribus et magis irregularibus, sculptura spirali vix oculo armato conspicua, nitidula; anfr. 6, priores obesi convexiusculi, penultimus et ultimus subplani, apex obtusus; sutura subsimplex, albida vel pallide grisea; apertura piriformi-lanceolata, dimidiam testæ longitudinem vix æquans, margine externo subperpendiculari, antrorsum leviter convexo, columella in medio excavato-arcuata, deorsum laminiformi, spiratim contorta, transversim truncata.

Long. 31, diam. 11½; apert. long. 16, diam. 6 millim.

Hab. N.W. Mexico: ? Mazatlan.

I have three specimens before me—two from Prof. W. Dunker's collection, marked *G. turris*, Mazatlan (fig. 9), and one from Mr. Pätel's collection labelled *G. albersi*, Peru; the real habitat of *G. excavata* is therefore quite uncertain. Nevertheless I do not like to omit this species, as it is very similar in its general form to *G. pseudoturris*, but quite distinct by the columella and also by colour.

The figure given by Binney [1] represents *G. excavata* rather well, both in the general shape and in the peculiar conformation of the columella. It is said to have been drawn from an authentic specimen of *G. albersi* in Cuming's collection; but it does not agree with the original description by Pfeiffer, who says "testa ovato-oblonga" and "columella substricte descendens," nor even with that of Binney, which is a translation of that given by Pfeiffer.

25. **Glandina largillierti.** (Tab. IV. figg. 14, 14 *a–d*, 15.)

Achatina (*Glandina*) *largillierti*, Pfr. Symb. Hist. Helic. iii. p. 90 (1846) [1].

Achatina largillierti, Pfr. Monogr. Helic. Vivent. ii. p. 295 [2].

Glandina largillierti, Morelet, Journ. de Conch. iii. p. 36 [3]; Fischer & Crosse, Miss. Scient. Mex., Mollusca, i. p. 116 [4].

Oleacina largillierti, Gray, Cat. Pulm. p. 38 [5]; Pfr. Monogr. Helic. Vivent. iv. p. 645 [6].

Achatina (*Glandina*) *yucatanensis*, Pfr. Symb. Hist. Helic. iii. p. 92 (1846) [7]; Pfr. Monogr. Helic. Vivent. ii. p. 291 [8].

Glandina yucatanensis, Morelet, Journ. de Conch. iii. p. 34 [9]; Strebel, Beitr. Mex. Land- und Süssw. Conch. ii. pp. 44, 45, t. 8. figg. 18, 18 *a–f* [10].

Oleacina yucatanensis, Gray, Cat. Pulm. p. 30 [11]; Pfr. Monogr. Helic. Vivent. iv. p. 641 [12].

Glandina (*Achatina*) *cylindracea*, Phillips, Proc. Acad. Phil. iii. p. 67, t. 1. fig. 33 [13].

Glandina cylindracea, Fischer & Crosse, Miss. Scient. Mex., Mollusca, i. p. 123 [14].

Oleacina (*Glandina*) *cylindracea*, Pfr. Monogr. Helic. Vivent. viii. p. 335 [15].

Achatina carnea, Pfr. P. Z. S. 1852, p. 157 [16]; Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, *Achatina*, no. 36, p. 318, t. 25. figg. 28–30 [17]; Pfr. Monogr. Helic. Vivent. iii. p. 519 [18].

Glandina carnea (Pfr.), H. & A. Adams, Gen. Moll. ii. p. 108 [19]; Fischer & Crosse, Miss. Scient. Mex., Mollusca, i. p. 123 [20].

Oleacina carnea, Gray, Cat. Pulm. p. 38 [21]; Pfr. Monogr. Helic. Vivent. iv. p. 645 [22].

? *Glandina* (*Oleacina*) *strebeli*, Angas, P. Z. S. 1879, p. 481, t. 40. fig. 11 [23].

Hab. YUCATAN [14 15] (*Largilliert* [1–6 7 8 9], *Norman* [13]); Campeche and Merida (*Höge*: 28½–30 millim. long.).

N. GUATEMALA: Coban, Alta Vera Paz (*Bocourt* [20]); Alta Vera Paz (*Bocourt* [4]).

S.E. COSTA RICA: Middle Zhorquin to Cuabre, low hills and flat ground (*Gabb* [23]).

I adopt willingly the results of the accurate comparisons made by H. Strebel in uniting the above four so-called species, as I find no essential difference, neither in the specimens labelled with these names in different collections, nor in the above-quoted descriptions.

Amongst a number of examples collected by Herr Höge at Campeche I find the following measurements:—

Long.	28½,	diam.	11,	apert.	13	millim.,
„	25	„	11	„	13	„
„	23	„	10½	„	12½	„

all apparently full-grown and similar in other respects. A younger shell with thin peristome measures:—

Long. 20, diam. 10, apert. 11 millim.

At Merida Herr Höge obtained two full-grown specimens:—

(*a*)	Long. 29,	diam. 10,	apert. 13½	millim.	(Fig. 14.)
(*b*)	„ 26½	„ 11½	„ 14	„	(Fig. 15.)

In this instance the extraordinary elongation of the first specimen is compensated by the narrowness of its last whorl.

A Mexican example found by F. Deppe on *Yucca filamentosa* was referred by me, in Malak. Blätt. 1865, p. 11, with some doubt to this species; a re-examination of this, however, compels me to retract this determination, the said specimen being apparently nothing but a young individual of *G. audebardi*. The misunderstanding which might arise from Fischer and Crosse's statement "in Republica Mexicana, Dr. Berendt" [20], is explained by his friend and companion Strebel (Mex. Beitr. Land- und Süssw.-Conch. ii. p. 45), who mentions that Dr. Berendt has collected also in Yucatan.

In this species the apex is very obtuse; the vertical riblets begin in the third whorl, and are here relatively stronger and more distant than in the following ones (fig. 14 *a*).

26. **Glandina multispira.**

Oleacina multispira, Pfr. P. Z. S 1861, p. 26 [1]; Novitat. Conch. ii. p. 163, t. 44. figg. 4, 5 [2]; Monogr. Helic. Vivent. vi. p. 270 [3]; Fischer & Crosse, Miss. Scient. Mex., Mollusca, i. p. 125 [4].

Hab. S. Mexico: Juquila, State of Oaxaca (*Boucard* [1–4]).

27. **Glandina oblonga.** (Tab. V. figg. 6, 6 *a*, *b*.)

Oleacina oblonga, Pfr. in Malak. Blätt. xiii. p. 86 (1866) [1]; Monogr. Helic. Vivent. vi. p. 273 [2].
Glandina oblonga (Pfr.), Fischer & Crosse, Miss. Scient. Mex., Mollusca, i. p. 138 [3].

Hab. E. Mexico: ? Mirador, State of Vera Cruz (*Berendt* [1–3]).
Central Mexico: Tehuacan, State of Puebla (*Höge*).

A specimen obtained at Tehuacan by Herr Höge (fig. 6) agrees very well with the original description of Pfeiffer. *G. oblonga* somewhat resembles *G. largillierti*, but is much more glossy; at first sight it seems to belong to *Streptostyla*, but the form of the columella is that of *Glandina*.

I have placed a point of interrogation to the locality given by Pfeiffer, because Strebel, who collected in company with Dr. Berendt, did not include its name among the numerous species from that quarter.

28. **Glandina bellula.**

Glandina bellula, Crosse & Fischer, in Journ. de Conch. xvii. p. 425 (1869) [1]; Fischer & Crosse, Miss. Scient. Mex., Mollusca, i. p. 128, t. 6. figg. 3, 8 *a* [2].
Oleacina (*Glandina*) *bellula*, Pfr. Monogr. Helic. Vivent. viii. p. 324 [3].

Hab. Mexico, without nearer indication of locality (*Botteri* [1 2], *Sallé* [3]).

D. *Lanceolatæ*.

29. **Glandina lanceolata,** sp. n. (Tab. IV. figg. 1, 1 *a*, *b*.)

Testa fusiformi-lanceolata, tenuis, irregulariter striatula, striis nonnullis varicis instar prominentibus, nitida, flava, concolor; spira regulariter attenuata, apice obtusiuscula; anfr. 7, sutura leviter plicatula et marginata, ultimus infra sensim attenuatus; dimidiam longitudinem paullo superans, lanceolata, margine externo subrecto, columellari valde excavato, transversim truncato.
Long. 30, diam. 12; apert. long. 14½, diam. 7 millim.

Hab. S.W. Mexico: Omilteme, State of Guerrero (*H. H. Smith*).

Recognizable by the thin glossy shell of yellow (not reddish or brownish) colour and the distinctly attenuated spire.

30. **Glandina aurantiaca.**

Glandina aurantiaca, Angas, P. Z. S. 1879, p. 481, t. 40. fig. 8 (magnified) [1].

Hab. S.E. Costa Rica: hilly country (*Gabb* [1]).

I have not seen a specimen of this species.

31. **Glandina decidua.** (Tab. IV. figg. 12, 13.)

Oleacina decidua, Pfr. P. Z. S. 1861, p. 26 [1]; Malak. Blätt. viii. p. 79 (1861) [2]; Monogr. Helic. Vivent. vi. p. 284 [3].

Glandina decidua (Pfr.), Fischer & Crosse, Miss. Scient. Mex., Mollusca, i. p. 122 [4].

Hab. S. Mexico: Juquila, State of Oaxaca (*Boucard* [1–4]).

The typical specimen described by Pfeiffer is not adult; I am indebted to Mr. Edgar Smith for the drawing of it (fig. 13) and of another (also contained in the British Museum) which is full-grown (fig. 12).

E. *Biconicæ.*

32. **Glandina cordovana.**

Achatina (*Varicella*) *cordovana*, Pfr. P. Z. S. 1856, p. 321 [1].

Oleacina cordovana, Pfr. Monogr. Helic. Vivent. iv. p. 629 [2].

Glandina cordovana (Pfr.), Fischer & Crosse, Miss. Scient. Mex., Mollusca, i. p. 87, t. 2. figg. 11, 11 *a* [3]; Strebel, Beitr. Mex. Land- und Süssw.-Conch. ii. pp. 51, 52, t. 13. fig. 45 [4].

Hab. E. Mexico: Cordova, State of Vera Cruz (*Sallé* [1–3]); Mirador (*Sartorius* [4], *in mus. Berol.* no. 18184),

Both these localities are situated on the elevated tract between the coast-plain and the edge of the high plateau. Cordova is 2790 feet above the sea, near Orizaba; Mirador is somewhat more to the north, 3630 feet above the sea, near the river Santa Maria.

Pfeiffer's original description was made from an imperfect example, but a satisfactory definition of the species is given by Fischer and Crosse. Their specimen is somewhat more slender than that of the Berlin Museum, and provided with brown varices, while in the latter the varices are white, like the whole shell. The ovate form with elongated spire and the angular production of the external edge of the aperture are characteristic of this species.

33. **Glandina delicatula.** (Tab. V. figg. 4, 5, 5 *a*.)

Achatina delicatula, Shuttl. in Bern Mittheil. 1852, p. 202 (Diagn. no. 2, p. 23) [1]; Pfr. Monogr. Helic. Vivent. iii. p. 514 [2].

Oleacina delicatula, Gray, Cat. Pulm. p. 28 [3].

Glandina (*Melia*) *delicatula*, H. & A. Adams, Gen. Moll. ii. p. 108 [4].

Glandina delicatula, Fischer & Crosse, Miss. Scient. Mex., Mollusca, i. p. 92 [5].

a. Var. major (fig. 5). Long. 24, apert. 13½ millim.

Hab. E. Mexico: State of Vera Cruz [1–3 5] (*Jacot-Guillarmod*); Cordova (*mus. Bern*); Jalapa (*Höge*).—Var. *a*. Coatepec (*Höge*).

Very near *G. cordovana*, but more elongated. In Shuttleworth's collection (now in the Museum at Berne) the label indicates positively Cordova as the locality ; the specimen, however, is somewhat larger than the dimensions given in this author's description, which appears to have been made from an example in the Museum of Neufchatel. The former is figured here (fig. 4). A specimen collected by Herr Höge at Jalapa is very like it, but wants the brown varices. The example from Coatepec here noted as var. *a* (fig. 5) agrees with that in the Museum of Berne in most respects, especially in the sculpture, varices, apex, and columella ; but it is distinctly larger and its last whorl is comparatively shorter.

34. **Glandina conferta.**

Oleacina conferta, Pfr. P. Z. S. 1861, p. 26[1] ; Malak. Blätt. viii. p. 79 (1862)[2] ; Monogr. Helic. Vivent. vi. p. 280[3].

Glandina conferta, Fischer & Crosse, Miss. Scient. Mex., Mollusca, i. p. 131 (part.)[4]; Strebel, Beitr. Mex. Land- und Süssw.-Conch. ii. p. 50, t. 13. figg. 44, 44 *a*[5] ; iii. p. 6[6].

Hab. E. Mexico : Mirador and Huatusco, State of Vera Cruz (*Berendt*[5]) ; Jalapa (*Höge*).
S. Mexico : Juquila, State of Oaxaca (*Boucard*[1–4]).

Var. *crossei*.

Ovata, fusca, sutura læviore, strigis fuscis nullis.

Glandina conferta, Fischer & Crosse, loc. cit. t. 6. fig. 7 (part.)[7].

Hab. E. Mexico : ? Orizaba (*Botteri*[7]).

This species seems to be very variable in size and also somewhat in general form. It may be distinguished from the allied *G. cordovana* by the more narrow and subcylindrical form of the last whorl, and by the outer edge of the aperture being produced in a slightly arcuated line throughout its length—in *G. cordovana* it exhibits a distinct obtusely angular projection somewhat above half the length.

Amongst the specimens I have seen the largest (long. 34 millim.) is from an old collection, without indication of locality ; the smallest, apparently a full-grown one (18 millim.), is in Pätel's collection and marked "Juquila," but I do not know whether by direct knowledge or only because Pfeiffer gives this locality. Pfeiffer's original examples are about halfway between them (25 millim.). One of 21 millim., very slender, of yellow colour, has been received from Herr Höge from Jalapa.

The shell, probably from Orizaba, figured by Fischer and Crosse[7] differs by its much more ventricose form, deeply arcuated columella, and livid fleshy-brown colour ; but they state expressly that Pfeiffer has determined these specimens as belonging to his *G. conferta*.

35. **Glandina speciosa.**

(*a*) *Achatina* (*Varicella*) *speciosa*, Pfr. P. Z. S. 1856, p. 321, t. 35. fig. 7[1] ; Novitat. Conch. i. p. 106, t. 29. figg. 13, 14[2].

Oleacina speciosa, Pfr. Monogr. Helic. Vivent. iv. p. 629[3].

(*b*) *Glandina speciosa* (Pfr.), Fischer & Crosse, Miss. Scient. Mex., Mollusca, i. p. 86, t. 2. figg. 10, 10 *a*[4].

(*c*) *Glandina speciosa,* Strebel, Beitr. Mex. Land- und Süssw.-Conch. ii. p. 51, t. 13. figg. 46, 46 *a*[5].

Hab. E. Mexico: Cordova, State of Vera Cruz (*Sallé* [1–4]); Huatusco, between Mirador and Orizaba; Orizaba (*Botteri* [4]).

This species seems to be nearly allied to *G. conferta*, but distinguished by an evident difference in the sculpture of the last whorl, the upper half being costulated, the lower half smooth. The costulation renders the suture crenulate. There are some impressed varices, white and pale brown. All the quoted descriptions agree in these characters; but the figures given by Pfeiffer himself [1 2], Fischer and Crosse [4], and Strebel [5] differ so much in shape *inter se* that I am at a loss how to reconcile them as belonging to one species—Pfeiffer's figure is somewhat biconical, like *G. conferta*, Fischer and Crosse's more narrowly cylindrical (perhaps not quite full-grown?), and Strebel's fig. 46, on the contrary, more ventricose, widened below. But as all these authors refer their figures to the same species and I have no specimens for examination, I dare not make any change of names.

36. Glandina ambigua.

Achatina ambigua, Pfr. P. Z. S. 1856, p. 321[1]; Monogr. Helic. Vivent. iv. p. 619[2].

Oleacina berendti, Pfr. in Malak. Blätt. xiii. p. 85 (1866)[3]; Novitat. Conch. iii. p. 321, t. 77. figg. 16, 17[4]; Monogr. Helic. Vivent. vi. p. 272[5].

Spiraxis (?) *ambigua,* Pfr. Monogr. Helic. Vivent. vi. p. 190[6].

Glandina ambigua (Pfr.), Fischer & Crosse, Miss. Scient. Mex., Mollusca, i. p. 139, t. 6. figg. 4, 4 *a–c*[7]; Strebel, Beitr. Mex. Land- und Süssw.-Conch. ii. p. 53, t. 2. fig. 48, & t. 13. figg. 48, 48 *a*[8].

Hab. E. Mexico: Cordova, State of Vera Cruz (*Sallé* [1 2 6]); Bajada del Ojo de Agua, near Cordova (*Sallé* [7]); Huatusco (*Berendt* [3–5 7 8]); Orizaba (*Botteri* [7]).

Quite peculiar in this genus by the regularly tapering spire and the rather broad pale band in the upper half of the last whorl.

37. Glandina tortillana.

Achatina (*Glandina*) *tortillana,* Pfr. P. Z. S. 1846, p. 32[1]; Monogr. Helic. Vivent. ii. p. 291[2]; ? Reeve, Conch. Icon. vi., *Achatina,* t. 15. fig. 66[3].

Glandina tortillana, Morelet, Journ. de Conch. iii. p. 34[4]; Strebel, Beitr. Mex. Land- und Süssw.-Conch. ii. p. 50[5].

Hab. Central America: Tortilla (*Pfeiffer*, from a label in Cuming's collection [1–5]).

Pfeiffer speaks[1] of opaque yellowish irregular spots and streaks in this species. A specimen named "*tortillana*" in Pätel's collection has opaque white roundish spots,

which are rather irregularly distributed; they are visible also on the inside of the shell, and look somewhat as if they were foreign bodies lying inside; but this is not the case, as they remain unaltered if the inside is well cleaned. Reeve's figure [3] shows no spots at all.

The situation of Tortilla is not known to me; Pfeiffer in the same publication (P. Z. S. 1846, p. 31), also gives it as the locality for *Achatina* (*Streptostyla*) *cylindracea*, which is found in Guatemala and in the State of Vera Cruz.

The affinity of this species is equally doubtful: Strebel [5] is of opinion that it is nearly allied to *G. conferta*, but he has not seen a specimen of it and judges only from Pfeiffer's description and Reeve's figure. The latter, I think, more resembles *G. turgida* and *G. filosa*; but I have some doubt whether the shell represented by Reeve may really belong to the species originally described by Pfeiffer.

F. *Turgidæ*.

38. **Glandina orizabæ.**

Achatina (*Varicella*) *orizabæ*, Pfr. P. Z. S. 1856, p. 320, t. 35. fig. 6 [1]; Novitat. Conch. i. p. 105, t. 29. figg. 11, 12 [2].

Oleacina orizabæ, Pfr. Monogr. Helic. Vivent. iv. p. 628 [3].

Glandina orizabæ, Fischer & Crosse, Miss. Scient. Mex., Mollusca, i. p. 85, t. 2. figg. 8, 8 *a* [4]; Strebel, Beitr. Mex. Land- und Süssw.-Conch. ii. p. 52 [5].

Hab. E. Mexico: Volcan de Orizaba, at a height of 3000 metres (*Sallé* [1–5]); Las Vigas, State of Vera Cruz, on the edge of the plateau N.W. of Jalapa, at about 7900 feet above the sea (*Höge*).

The specimens collected by Herr Höge are yellowish, like the figures given by Fischer and Crosse; but the white varices are considerably less conspicuous, and the surface of the shell exhibits many whitish vertical, more or less elongate, streaks and whitish round spots, which seem to be the results of wearing and scraping. They agree better in coloration with Pfeiffer's figures, but they are not nearly so dark.

39. **Glandina turgida.** (Tab. IV. figg. 16–20 *a*.)

Oleacina turgida, Pfr. P. Z. S. 1861, p. 26 [1]; Malak. Blätt. viii. p. 79 (1861) [2]; Monogr. Helic. Vivent. vi. p. 280 [3].

Glandina turgida, Fischer & Crosse, Miss. Scient. Mex., Mollusca, i. p. 130 [4].

Hab. S. Mexico: Juquila, in the State of Oaxaca (*Boucard* [1–4]).

Var. *sayulana*. (Figg. 17–20 *a*.)

Testa ovato-oblonga, subcylindrica, leviter striata, nitidula, rubello-flavida; spira elongata, obtusiuscula; anfr. $6\frac{1}{2}$, convexis, penultimo sat magno, sutura subsimplice, violascente; apertura dimidiam longitudinem vix æquans vel paullo brevior, lanceolata, margine externo leviter antrorsum arcuato, columella modice arcuata, alba.

Long. 28–30, diam. 12, apert. 14–15 millim.

Hab. W. Mexico: Sayula, State of Jalisco (*Höge*).

Resembles in its general form *G. largillierti*, but larger, broader, and wanting the distinctly marginate and crenulated suture. Fischer and Crosse's figure of *G. filosa* (t. 6. fig. 5) represents a shell somewhat similar in shape, but of larger size and with a stronger sculpture.

I am indebted to Mr. Edgar Smith for a figure of the type of this species (fig. 16).

40. **Glandina filosa.** (Tab. V. figg. 2, 2 *a*, *b*.)

Achatina (*Glandina*) *filosa*, Pfr. P. Z. S. 1855, p. 100 [1].

Oleacina filosa, Pfr. Monogr. Helic. Vivent. iv. p. 640 [2]; vi. p. 279 [3].

Glandina filosa (Pfr.), Fischer & Crosse, Miss. Scient. Mex., Mollusca, i. p. 129, t. 6. fig. 5 (part.) [4].

Hab. E. Mexico: Orizaba [3], State of Vera Cruz [4].

Figured from a specimen in Pfeiffer's collection. The vertical riblets are very distinct and narrow, the apex of the shell rather minute.

41. **Glandina fischeri,** sp. n. (Tab. V. figg. 3, 3 *a*.)

Glandina filosa (Pfr.), var. *β*, Fischer & Crosse, Miss. Scient. Mex., Mollusca, i. p. 129 [1].

Hab. Central Mexico: Toluca (*Boucard* [1], *Höge*).

I have no doubt that the specimens collected by Herr Höge at Toluca are conspecific with Fischer and Crosse's var. *β* of *G. filosa* from the same locality. Pfeiffer's *G. filosa* belongs to quite a different species. I have examined a specimen in his collection, and find that it has a distinctly more tapering spire, and the vertical ribs (to which it owes its name) distinctly more elevated. These specimens from Toluca are irregularly plaited near the suture, but the plaits or riblets very soon become quite faint and flat as they descend downwards; the colour is yellowish brown, the columella very much arcuated. In the general form, sculpture, and colour of the shell, *G. fischeri* somewhat resembles large specimens of *Limnæa palustris*. It is intermediate in form between *G. filosa* and *G. pseudoturris*; but is distinct from both by the much more blunt apex (like that of *G. audebardi*), the somewhat coarser sculpture near the suture, and the arcuated columella.

42. **Glandina sulcifera,** sp. n. (Tab. V. figg. 1, 1 *a*, *b*.)

Testa ovato-oblonga, brevispira, rugis perpendicularibus latiusculis per sulcos impressos divisis subinæqualibus sculpta, griseo-carnea, nitida; sutura irregulariter crenulata, albo-violascens; spira late conica, obtusa; anfr. 6, priores 3 læves; apertura ovato-lanceolata, dimidiam testæ altitudinem paullo superans, margine columellari crassiusculo, valde obliquo, albo, late truncato.

Long. 32, diam. 13; apert. long. 17, diam. 7 millim.

Hab. W. Mexico: Jalisco (*Schumann*).

43. **Glandina albersi.** (Tab. IV. figg. 10, 10 *a*, 11.)

Achatina (*Glandina*) *albersi*, Pfr. P. Z. S. 1854, p. 295 [1].

Glandina albersi, Carpenter, Cat. of Mazatl. Shells, p. 175 [2]; Tryon, in Am. Journ. Conch. ii. p. 227, t. 16. fig. 9 (young shell) [3]; Binney, Terr. and Freshw. Shells of N. Am. i. p. 18 (not the figure) [4]; Fischer & Crosse, Miss. Scient. Mex., Mollusca, i. p. 127 [5]; Strebel, Beitr. Mex. Land- und Süssw.-Conch. ii. pp. 7–9, t. 11. figg. 21, 21 *a*, *b* (good), t. 6 *a*. figg. 21 *c*, *f*, *g*, t. 12. figg. 21 *c–e* (not full-grown) [6].

Oleacina albersi, Pfr. Monogr. Helic. Vivent. iv. p. 640 [7].

Var. *inflata*. (Fig. 11.)

Magis ventricosa, spira breviore, columella paullo magis arcuata. Long. 27½, diam. 13, apert. 11 millim.

Hab. N.W. Mexico; Mazatlan (*Reigen* [2]); Mazatlan and Tres Marias Islands (*Forrer*; specimens in the Berlin Museum, 33 millim. long.); Sierra Madre de Colima (*Xantus* [5]); Tepic (*Richardson*; typical form and var. *inflata*).

The original locality given by Pfeiffer [1] is the "Gulf of California." The additional habitat "Tumaco" (in Ecuador) (Albers, Die Helic. ed. 2, p. 27) is founded on a label in the collection of the late Mr. Albers upon the authority of Cuming, and is very probably an error.

By some authors this *Glandina* seems to have been confounded or combined with much more elongated species from the same country, such as *G. turris* and *G. excavata*.

44. **Glandina mitriformis.**

Glandina (*Oleacina*) *mitriformis*, Angas, P. Z. S. 1879, p. 481, t. 40. fig. 10 [1].

Hab. S.E. Costa Rica: Middle Zhorquin to Cuabre, low hills and flat ground (*Gabb* [1]).

In outline this shell resembles *G. albersi*; I have not seen a specimen of it.

45. **Glandina monilifera.**

Glandina monilifera, Pfr. P. Z. S. 1845, p. 75 [1]; Morelet, Journ. de Conch. iii. pp. 38, 258 [2]; Fischer & Crosse, Miss. Scient. Mex., Mollusca, i. p. 89 (excl. var. β) [3]; v. Mart. in P. Z. S. 1875, p. 647 [4]; Jousseaume, Bull. Soc. Zool. Fr. iii. p. 169 (1878) [5].

Glandina monilifera, Form A, Strebel, Beitr. Mex. Land- und Süssw.-Conch. ii. p. 48, t. 13. fig. 42 [6].

Achatina (*Glandina*) *monilifera*, Pfr. Monogr. Helic. Vivent. ii. p. 290 [7].

Achatina monilifera, Reeve, Conch. Icon. vi., *Achatina*, t. 14. fig. 50 [8].

Oleacina monilifera, Gray, Cat. Pulm. p. 27 [9]; Pfr. Monogr. Helic. Vivent. iv. p. 641 [10].

Glandina rubella, Morelet, Test. Noviss. i. p. 14 (1849) [11], & ii. p. 27 (=*monilifera*) [12].

Achatina (*Glandina*) *rubella* (Morel.), Pfr. Monogr. Helic. Vivent. iii. p. 513 [13].

Oleacina rubella, Gray, Cat. Pulm. p. 27 [14]; Pfr. Monogr. Helic. Vivent. iv. p. 641 [15].

Var. *pulcherrima*

Glandina monilifera, var. β, Fischer & Crosse, loc. cit. p. 89, t. 3. fig. 5 [16].

Glandina monilifera, Form B, Strebel, Beitr. Mex. Land- und Süssw.-Conch. ii. p. 49, t. 13. figg. 43, 43 *a* [17].

Glandina pulcherrima, Strebel, Verh. Ver. f. naturw. Unterh. Hamb. v. p. 104 (1882) [18].

Hab. E. Mexico: Coatepec above Jalapa, rather copiously (*Doña Estefania* [18], *Höge*—only the var. *pulcherrima*); Quautlatitlan (*Strebel*; mus. Berol. no. 30738); Orizaba (*Botteri* [17]); probably also Cordova (*Sallé* [3]).

S.W. Mexico: Omilteme, State of Guerrero (*H. H. Smith*).

Chiapas (*Ghiesbreght* [3]).

N. Guatemala: mountains of Coban (*coll. Cuming* [1]); Coban (*Delattre* [3 7 8], *Salvin* [4], *Sarg* [6]); Vera Paz (*Morelet* [3 11 12], *Salvin* [3], *Boucard* [5]); Cahabon (*Champion*).

The variety is nearly allied to *G. orizabæ*, but of smaller size, with more distinct costulation, especially on the upper whorls, and more distinct markings at the suture; it has the varices very faintly coloured and in some specimens scarcely visible, whereas they are very distinct in the type. Reeve's figure [8] represents a more bulky form (long. 32, diam. 16, apert. 18 millim.) than I have ever seen.

46. **Glandina obtusa.**

Glandina obtusa, Pfr. in Philippi's Abbild. i. p. 132, t. 1. fig. 3 (1844) [1]; P. Z. S. 1845, p. 42 (?) [2]; Albers, Die Helic. ed. 1, p. 197 [3], ed. 2, p. 27 [4]; Strebel, Beitr. Mex. Land- und Süssw.-Conch. ii. p. 36, t. 10. figg. 26, 26 *a*, *b* [5].

Achatina obtusa, Pfr. in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, *Achatina*, no. 80, p. 347, t. 38. figg. 5, 6 [6].

? Var. major.

Achatina (*Glandina*) *obtusa*, Pfr. Monogr. Helic. Vivent. ii. p. 281 (1848) [7].

Achatina obtusa, Reeve, Conch. Icon. vi., *Achatina*, t. 15. fig. 62 [8]; Deshayes, in Férussac's Hist. Nat. Moll. Terr. ii. p. 173, t. 134. figg. 3, 4 [9].

Oleacina obtusa (Pfr.), Gray, Cat. Pulm. p. 17 [10].

Hab. Nicaragua: Realejo, on the leaves of shrubs (*coll. Cuming* [1–10]).

The quoted descriptions and figures, although all giving Realejo (also written Real Llejos) as the locality, refer to two forms, which are distinct one from the other in size and shape. The smaller one, $16\frac{2}{3}$–19 millim. in length, and about half as much in breadth, is that first described and figured in Philippi's work [1], and it is also represented in Pfeiffer's collection; this is the only form of which I have specimens before me. The larger one, 26–28 millim. in length, and distinctly less than half this in breadth, is figured by Reeve and Deshayes; it very much resembles in its dimensions *G. largillierti*, from Guatemala and Yucatan, but it seems to be more smooth and shining.

The very obtuse, nearly flat apex resembles that of *G. audebardi*; but in this species specimens of the same size and with the same number of whorls as *G. obtusa* clearly show the unequal denticles at the suture. Young specimens of *G. monilifera*

and *G. pulcherrima* are more tapering near the apex and have a distinctly stronger sculpture.

It is a question whether the larger form may not be the full-grown one, and the smaller only a young one. In the specimens before me of the small form, however, the outer edge of the aperture is not thin, but somewhat thickened and distinctly arched; the same is the case with Pfeiffer's specimen of the small form, which is figured by Strebel. So I think that they may be full-grown. The number of whorls is five and a little more.

The Mexican example referred by myself in Malak. Blätt. 1865, p. 12, with considerable doubt, to *G. obtusa* does not belong to it; it is a young specimen of some other species, perhaps of *G. audebardi*.

Martini and Chemnitz's figure (Syst. Conch.-Cab. ed. 2, *Achatina*, t. 38. figg. 5, 6) is too dark in colour, and too much striped in comparison with that of other species and with the specimens I have seen.

47. **Glandina stigmatica.**

Achatina (*Polyphemus*) *stigmatica*, Shuttl. in Bern Mittheil. 1852, p. 202 (Diagn. no. 2, p. 22) [1]; Pfr. Monogr. Helic. Vivent. iii. p. 514 [2].

Oleacina stigmatica (Shuttl.), Gray, Cat. Pulm. p. 27 [3]; Pfr. Monogr. Helic. Vivent. iv. p. 641 [4].

Glandina stigmatica (Shuttl.), Fischer & Crosse, Miss. Scient. Mex., Mollusca, i. p. 91, t. 2. figg. 9, 9 *a* [5].

Hab. E. Mexico: Cordova, State of Vera Cruz (*Jacot-Guillarmod* [1–5]); Orizaba (*Botteri* [5]); Atoyac, State of Vera Cruz (*Schumann*; one specimen).

This small, smooth, and rather narrowly fusiform species, with very broad dark streaks, stands somewhat isolated from the other members of the genus; it is, perhaps, nearest allied to *G. monilifera* and *G. obtusa*, notwithstanding its different general form.

48. **Glandina nana.** (Tab. V. fig. 7.)

Achatina (*Polyphemus*) *nana*, Shuttl. in Bern Mittheil. 1852, p. 202 (Diagn. no. 2, p. 22) [1].

Achatina nana, Pfr. Monogr. Helic. Vivent. iii. p. 516 [2].

Oleacina nana (Shuttl.), Gray, Cat. Pulm. p. 32 [3].

Glandina nana (Shuttl.), Fischer & Crosse, Miss. Scient. Mex., Mollusca, i. p. 133, t. 2. figg. 7, 7 *a*, *b* [4]; Strebel, Beitr. Mex. Land- und Süssw.-Conch. ii. p. 37 [5].

Hab. E. Mexico: Cordova [5], State of Vera Cruz (*Jacot-Guillarmod* [1–4]); Misantla (*Höge*).

Very curious by its small size, in other respects resembling somewhat the North-American *G. bullata*. It cannot be a young state, because already the first whorls are remarkably small and in due proportion to the whole shell. The specimen collected by M. Sallé, and figured by Fischer and Crosse, is considerably more ventricose than the typical one in Shuttleworth's collection, which we figure here (fig. 7). The upper whorls are much narrower and the sculpture is much stronger than in *G. obtusa*.

G. *Difficiles.*

49. Glandina difficilis.

Glandina difficilis, Crosse & Fischer, in Journ. de Conch. xvii. p. 426 (1869) [1]; Fischer & Crosse, Miss. Scient. Mex., Mollusca, i. p. 132, t. 6. figg. 3, 3 *a* [2]; Strebel, Beitr. Mex. Land- und Süssw.-Conch. ii. p. 54 [3].

Oleacina difficilis (Cr. & Fisch.), Pfr. Monogr. Helic. Vivent. viii. p. 328 [4].

Hab. Mexico: probably in the environs of Orizaba (*Botteri* [1] [2]).

This shell exhibits a distinctly twisted columella, by which it approaches somewhat to *Streptostyla*; in other respects it resembles some of the smaller species of the group "Turritæ." Strebel [3] thinks that it may be nearer allied to *G. ambigua*, but he has not himself examined a specimen.

The following four species probably do not enter within the limits of this work; but as some well-known authors have admitted them among the Mexican or Central-American species, I also am obliged to enumerate them here, in order to ascertain their probable geographical distribution. Two of them are the first known species of the genus, and their synonymy, chiefly that of the older authors, is somewhat intricate.

50. Glandina truncata.

—— ——, Lister, Hist. Conch. ed. 2, App. t. 4. (1059), fig. 4 (1770) [1].

—— ——, Kämmerer, Conch. Cab. d. Erbp. v. Schwarzb.-Rudolst. p. 128, t. 10. fig. 5 (1786) [2].

Bulla truncata, Gmel. Syst. Nat. i. 6, p. 3434 (1788–1791) [3].

Glandina truncata, Say, Amer. Conch. ii. t. 20 (1831) [4]; Beck, Ind. Moll. p. 78 [5]; Binney, Terr. air-breathing Moll. U.S. ii. p. 301, tabb. 59, 60 [6], & v. p. 84 [7]; Land- and Freshw.-Shells of N. Am. i. p. 15 [8]; Manual of Amer. Landshells, p. 348 [9]; Tryon, in Am. Journ. of Conch. ii. p. 225, t. 16. fig. 1, 2 [10]; Strebel, Beitr. Mex. Land- und Süssw.-Conch. ii. pp. 5–7, t. 3. fig. 1 [11], & iii. p. 7 [12].

Achatina truncata (Gmel.), Pfr. Monogr. Helic. Vivent. ii. p. 287 [13]; Reeve, Conch. Icon. vi., *Achatina*, t. 13. fig. 47 [14].

Oleacina truncata, Gray, Cat. Pulm. p. 23 (1855) [15]; Pfr. Monogr. Helic. Vivent. iv. p. 638 [16].

Polyphemus glans, Say, Journ. Acad. Phil. i. p. 282 (1817–1818) (nec Montf.) [17].

Helix rosea, Férussac, Prodr. p. 50. no. 356 (1821–1822) [18]; Hist. Nat. Moll. Terr. t. 135. fig. 3 [19].

Achatina rosea, Gray, Ann. Philos., new ser. ix. p. 414 (1825) [20]; Deshayes, Encycl. Méth. ii. p. 10 (1830) [21].

Achatina striata, Deshayes, in Lamarck's Syst. Anim. sans Vert. ed. 2, viii. p. 313 (nec Müll.) [22].

Hab. Southern United States: Atlantic and Gulf States from South Carolina to Florida [4] [17], Louisiana [8], and Texas [8]; very common on the islands and keys along the coast [7], also in the marshes behind the coast sand-hills [4]; inland—as far north as Macon in Georgia, Bibb County in Alabama, and Jackson in the State of Mississippi [9].

Var. *parallela.*

Glandina parallela, Binney, Proc. Ac. Phil. 1857, p. 189 [23]; Terr. air-breathing Moll. U. S. iv. p. 140, t. 62. fig. 3 [24]; Land- and Freshw. Shells of N. Am. i. p. 17. fig. 7 [25]; Tryon, in Am. Journ. of Conch. ii. p. 226, t. 16. fig. 3 [26].

Oleacina parallela (Binn.), Pfr. Monogr. Helic. Vivent. vi. p. 277 [27].

Glandina truncata, Form B, Strebel, Beitr. Mex. Land- und Süssw.-Conch. ii. p. 6, t. 3. figg. 2, 2 *a–d* [28].

Hab. Southern United States: Louisiana [24 26], Florida [28], and Texas, especially at Matamoros [24] *.

Var. *bullata.*

Glandina bullata, Gould, Proc. Bost. Soc. Nat. Hist. iii. p. 64 (1848) [29]; Binney, Terr. air-breathing Moll. U.S. ii. p. 298, t. 62 *a* [30]; Land- and Freshw. Shells of N. Am. i. pp. 19, 20 [31].

Achatina (*Glandina*) *bullata,* Pfr. Monogr. Helic. Vivent. iii. p. 512 [32].

Oleacina bullata, Gray, Cat. Pulm. p. 24 [33]; Pfr. Monogr. Helic. Vivent. iv. p. 638 [34].

Glandina truncata, var. *abbreviata,* v. Mart. in Albers's Die Helic., ed. 2, pp. 26, 29 [35].

Glandina truncata, Form C, Strebel, Beitr. Mex. Land- und Süssw.-Conch. ii. p. 6, t. 3. figg. 3, 3 *a–d* [36].

Hab. Southern United States: Louisiana [30 35 36].

A well-known species of the Southern United States. It is said to occur also in Mexico, but I have no positive evidence of this. The specimen in the Berlin Museum, collected at Angangueo, Michoacan, by Deppe, and referred by Strebel [36] (fig. 3 *e*) to *G. truncata,* I think probably belongs to *G. indusiata.*

51. Glandina striata.

Buccinum striatum, O. Fr. Müller, Hist. Verm. ii. p. 149 (1774) ("testa turrita, strigis raris fulvis") [1]; Chemnitz, Syst. Conch.-Cab. ix. 2, p. 36, t. 120. fig. 1030 (copied in 2nd ed., *Achatina,* no. 7, p. 296, t. 3. fig. 9) (not figs. 1028, 1029) [2].

Strombus striatus, Gmelin, Syst. Nat. i. 6, p. 3524 [3].

Bulimus striatus, Brug. Encycl. Méthod. i. p. 366 (1789–1792) [4].

Achatina striata, Gray, Ann. Philos. new ser. ix. p. 414 (1825) [5].

Glandina striata (Müll.), Beck, Index Moll. p. 288 (1837) [6]; Strebel, Beitr. Mex. Land- und Süssw.-Conch. ii. pp. 23–26, t. 7. figg. 15, 15 *a*, *b*, & t. 2. fig. 15 [7]; v. Mart. in Albers's Die Helic. ed. 2, p. 28 (1860) [8].

Achatina striata, Pfr. Monogr. Helic. Vivent. ii. p. 287 [9].

Oleacina striata (Müll.), Gray, Cat. Pulm. p. 24 [10].

Helix tenera, Gmelin, Syst. Nat. i. 6, p. 3653 [11].

Helix incumbens, Dillwyn, Descr. Cat. Shells, ii. p. 955 (1817) [12].

Helix (*Cochlicopa*) *mülleri,* Férussac, Prodr. p. 50. no. 357 [13].

Achatina mülleri, Gray, in Griffith's Anim. Kingd. t. 27. fig. 5 [14]; Guérin, Icon. Moll. t. 6. fig. 14 [15]; Deshayes, in Lamarck's Syst. Anim. sans Vert. ed. 2, viii. p. 312 [16]; Reeve, Conch. Icon. vi., *Achatina,* t. 8. fig. 25 [17].

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* Matamoros is on the south side of the mouth of the Rio Grande, and therefore in Mexican territory. But the Fauna and Flora are strictly Texan.—Edd.

Bulimus mülleri, d'Orbigny, Voy. dans l'Amér. mérid. v., Moll. p. 256 [18].
Achatina dactylus, Brod. P. Z. S. 1832, p. 32 [19]; Reeve, Conch. Syst. ii. t. 179. fig. 16 [20].
Glandina dactylus (Brod.), v. Mart. in Albers's Die Helic. ed. 2. p. 28 [21].
Glandina strigosa, v. Mart. in Albers's Die Helic. ed. 2, p. 28 [22].
? *Glandina lineata*, Strebel, Beitr. Mex. Land- und Süssw.-Conch. iii. p. 47, t. 9. fig. 10 (1878) [23].
Hab. ? E. Mexico.

South America, widely distributed: Colombia, Sonson and Ocaña (*Wallis* [7]); Guiana (*Schomburgk*), Cayenne (*Howe* [13]); Ecuador [7], Tumaco I. [17 19 20]; North Peru, Xeberos on the River Huallaga, east of the Cordillera (*Bartlett* [7]); Bolivia, Yuracares (*d'Orbigny* [18]); Southern Brazil, Theresopolis, in the province of Santa Catarina—a specimen given to the Berlin Museum by Dr. Aug. Müller.

The specimen described by Strebel as *G. lineata* [23] is stated to have been found near San Juan Miahuatlan, between Jalapa and Misantla: I cannot distinguish it from examples from Colombia and Ecuador. In the collection of the late Mr. Albers "Mexico" is also given as a locality on the labels of two specimens, upon the authority of Cuming and Bernardi. Nevertheless, it is highly improbable that a species so distinct and so large should inhabit both Mexico and the continent of South America, and not yet have been found in the intervening region; I cannot help thinking that some mistake must have been made in labelling the supposed Mexican specimens.

52. **Glandina plicatula.**

Achatina plicatula, Pfr. P. Z. S. 1851, p. 258 [1]; Monogr. Helic. Vivent. iii. p. 517 [2]; Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, *Achatina*, no. 38, p. 319, t. 26. fig. 2 [3].
Glandina plicatula (Pfr.), H. & A. Adams, Gen. Moll. p. 108 [4]; Fischer & Crosse, Miss. Scient. Mex., Mollusca, i. p. 95 [5]; v. Mart. Die Binnenmoll. von Venez. (in Festschr. der Ges. naturf. Freunde in Berlin, 1873), p. 8 [6]; Mousson, in Malak. Blätt. xxi. p. 15 (1873) [7]; Strebel, Beitr. Mex. Land- und Süssw.-Conch. ii. pp. 19, 20, & t. 6. figg. 33, 33 *a–e*, 34, 34 *a*, *b*, 35, 35 *a–c*, & t. 4. fig. 33 [8].
Oleacina plicatula (Pf.), Gray, Cat. Pulm. p. 34 [9]; Pfr. Monogr. Helic. Vivent. iv. p. 643 [10].
Achatina lignaria, Appun, Unter den Tropen, i. p. 548 (1879) [11].
Glandina, sp. n., Appun, loc. cit. p. 551 [12].

Hab. Colombia: in the Andes [1 2 3 9]; Ocaña and Sonson (*Wallis* [7 8]).
Venezuela: Cumbre de San Hilario, and Chino near San Felipe, in the mountain forests (*Appun* [6 11 12]); Cumbre de Valencia (*Dr. Kretz* [8]); San Esteban, near Puerto Cabello [8]; Caracas (*Lansberg* [6]).

Concerning the Guatemalan locality quoted by Fischer and Crosse [5], see *G. pinicola*, anteà p. 64.

53. **Glandina attenuata.**

Achatina (*Glandina*) *attenuata*, Pfr. P. Z. S. 1851, p. 259 [1].
Achatina attenuata, Pfr. in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, *Achatina*, no. 43, p. 322, t. 26. figg. 10, 11 [2]; Monogr. Helic. Vivent. iii. p. 527 [3].
Glandina (*Oleacina*) *attenuata*, Albers, Die Helic. ed. 2, p. 32 [4].

Hab. Central America (*coll. Cuming* [1–4]).

The habitat of this species is doubtful. It belongs to a natural subdivision of *Glandina* with a smooth, shining shell, all other species of which are confined to the islands of the West Indies.

SALASIELLA.

Salasiella, Strebel, Beitr. Mex. Land- und Süssw.-Conch. iii. p. 6 (1878).

Shell oblong, conical, or fusiform, of vitreous appearance, smooth or feebly striated, thin and shining; columella as in *Glandina.* Teeth of the radula with distinctly stouter basal part and more blunt point than in *Glandina,* the two laterals next to the median very stout. For an account of the anatomy, see Strebel (*op. cit.* p. 29, t. 10).

All the species are of small size and unicolorous. In an artificial system they must remain united with *Glandina*; but the rather peculiar facies and the small size give some additional weight to the difference in the radula.

Dedicated to the family Salas in Vera Cruz, who helped Mr. Strebel most successfully in collecting the land-shells of this province.

1. **Salasiella margaritacea.** (Tab. V. fig. 8.)

Achatina margaritacea, Pfr. P. Z. S. 1856, p. 321 [1].
Oleacina margaritacea, Pfr. Monogr. Helic. Vivent. iv. p. 636 [2].
Glandina margaritacea, Fischer & Crosse, Miss. Scient. Mex., Mollusca, i. p. 136 [3].

Hab. E. Mexico: Cordova, State of Vera Cruz (*Sallé* [1–3]).

Very distinct by its coniform shape, thus resembling many *Streptostylæ,* but the conformation of the columella is that of *Glandina.* The figure here given is drawn from a specimen in the late Mr. Pätel's collection, of somewhat smaller size than Pfeiffer's example.

2. **Salasiella joaquinæ.**

Salasiella joaquinæ, Strebel, Beitr. Mex. Land- und Süssw.-Conch. iii. p. 29, t. 9. fig. 6, & t. 10. figg. 1–7 (anatomy) [1].

Hab. E. Mexico: Jalapa (*Doña Estefania* [1]).

3. **Salasiella modesta.**

Oleacina modesta, Pfr. in Malak. Blätt. ix. p. 98 (1862) [1]; Monogr. Helic. Vivent. vi. p. 275 [2].
Glandina modesta (Pfr.), Fischer & Crosse, Miss. Scient. Mex., Mollusca, i. p. 135 [3]; Strebel, Beitr. Mex. Land- und Süssw.-Conch. ii. p. 52, t. 13. fig. 49 [4].
Salasiella modesta, Strebel, loc. cit. iii. p. 30, t. 9. fig. 9 [5].

Hab. E. Mexico: Mirador, on the soil of freshly uprooted woods, probably subterraneous (*Strebel* [4 5]).

The statement "Prope Vera Cruz (*Berendt*)" [1 2], or environs of Vera Cruz [3], is contradicted by Berendt's companion Strebel [4]: the province of Vera Cruz is intended.

TABLE OF SPECIES OF *SALASIELLA**.

Nomen.	Figura.	Sculptura.	Coloratio.	Spira.	Sutura.	Columella.	Long.	Diam.	Apert.	Patria.
margaritacea, *Pfr.* ...	coniformis.	lævis.	flavescenti-hyalina, pellucida.	brevis.	profunda, anguste marginata.	leviter arcuata.	mm. 9⅓ 8½	mm. 3⅓ 3½	mm. 7 6	E. Mexico.
joaquinæ, *Streb.*	subcylindrica.	striatula.	pallide flava.	breviuscula.	subsimplex.	arcuata.	8½	3	5	E. Mexico.
modesta, *Pfr.*	fusiformis.	sublævis, striis impressis nonnullis verticalibus.	pallide carnea, pellucida.	obesa.	submarginata.	arcuata.	4½	1¾	3¼	E. Mexico.
perpusilla, *Pfr.*	,,	arcuato-striata.	pallide succinea, pellucida.	sat obesa.	profunda, anguste marginata.	leviter arcuata, oblique truncata.	4½	1½	2¾	E. Mexico, Guatemala.
pulchella, *Pfr.*	subcylindrica.	sublævis.	corneo-albida.	convexo-conica.	anguste marginata.	subrecta.	10½	4	7	Chiapas.

* So far as at present known, this genus is confined to Mexico and Guatemala.

4. **Salasiella perpusilla.**

Oleacina perpusilla, Pfr. in Malak. Blätt. xiii. p. 86 (1866)[1]; Monogr. Helic. Vivent. vi. p. 281[2].
Glandina perpusilla (Pfr.), Fischer & Crosse, Miss. Scient. Mex., Mollusca, i. p. 134, t. 3. figg. 4, 4 *a–c*[3]; Strebel, Beitr. Mex. Land- und Süssw.-Conch. ii. p. 53[4].
Salasiella perpusilla, Strebel, loc. cit. iii. p. 30, t. 9. fig. 8[5].

Hab. E. Mexico: Mirador (*Berendt* [1–4]); Jalapa, in the wood of Pacho (*Doña Estefania* [5]).
S. Guatemala: Hacienda Helvetia, in the Costa Cuca, 2500 feet above the sea (*Stoll*).

Very near to the preceding; whorls more inflate near the suture.

5. **Salasiella pulchella.** (Tab. V. fig. 9.)

Achatina pulchella, Pfr. P. Z. S. 1856, p. 379[1].
Oleacina pulchella, Pfr. Monogr. Helic. Vivent. iv. p. 635[2].
Glandina pulchella, Fischer & Crosse, Miss. Scient. Mex., Mollusca, i. p. 136[3].

Hab. Chiapas (*Ghiesbreght* [1–3]).

Typical specimens in the British Museum (fig. 9).

STREPTOSTYLA.

Spiraxis, sect. 1. *Glandinæformes* s. *Streptostyla,* Shuttleworth, in Bern Mittheil. 1852, p. 203.

"Shell oblong, attenuated below; aperture narrow; outer margin often inflexed; columella strongly contorted, furnished with a callous lamina, deeply intrant, and scarcely truncate anteriorly" (*H. & A. Adams*). The living animal elongated in its fore part, with small triangular labial palpi in addition to the four feelers; eyes as in *Glandina*. Teeth of the radula narrow, spiniform; median tooth present. Mode of life similar to that of *Glandina*.

The majority of the species have a quite smooth shining shell; therefore this character will not be repeated for each species in the following table, but only the exceptions mentioned.

Living animal—see Fischer & Crosse, Miss. Scient. Mex., Mollusca, i. t. 2. fig. 15 *a*, and Strebel, Beitr. Mex. Land- und Süssw.-Conch. iii. t. 22. figg. 2, 3; an exact account of the anatomy is to be found in the same works.

Like *Glandina*, this genus is pre-eminently Central-American, and its distribution within our limits is very similar; a few rather aberrant species are also found in the West Indian islands—*S. cubaniana*, *S. moreletiana*, *S. suturalis*, *S. episcopalis*, all in Cuba. But the northern limit of this genus lies in Mexico itself, and also towards the

south it is more restricted, only one species being found in South America, viz. *S. subcallosa*, Pfr., in Venezuela. Pfeiffer quotes another from Peru, *S. peruviana* (Lam.); but this very fine species seems to be more nearly allied to the subgenus *Varicella* of *Glandina*, especially to *G. leucozonias*, and its habitat in Peru is, so far as I know, not confirmed by any later traveller.

Geographical Distribution of the Species of Streptostyla.

N. Mexico	No species hitherto known.
N.E. Mexico	,,
N.W. Mexico	,,
Central Mexico	,,
E. Mexico	*nicoleti, botteriana, mitræformis, delattrei* (varr. *edwardsiana* and *sallæi*), *irrigua, shuttleworthi* (with varr.), *cylindracea, coniformis, turgidula, lurida, plicatula, flavescens, fulvida, glandiformis, physodes, limnæiformis, vexans, boyeriana, mohriana, ligulata.*
W. & S.W. Mexico	*shuttleworthi* var. *similis, conulus, flavescens* var. *boucardi.*
Tabasco and Central Chiapas	*dubia, nigricans, shuttleworthi, biconica, lurida* var., *limnæiformis* var. *parvula, oblonga, ligulata, catenata.*
Yucatan	*cylindracea, ventricosula, meridana.*
N. Guatemala	*nigricans, mitræformis, delattrei, turgidula* var., *labida, lurida, delibuta, meridana* var. *cobanensis, sargi, ligulata.*
Central Guatemala	*sololensis, ventricosula* var. *binneyana.*
E. Guatemala	*delattrei, delibuta.*
S. Guatemala	*turgidula* var., *meridana* var. *cobanensis.*
Honduras	*obesa, thomsoni, dysoni.*
Salvador	No species hitherto known.
S.W. Nicaragua	,,
Central Nicaragua	*dysoni.*
Mosquito coast	No species hitherto known.
N. Costa Rica S. & S.E. Costa Rica	*mitræformis*, ? *cylindracea, turgidula, ventricosula* var. *binneyana, viridula*, ? *flavescens* var. *boucardi.*
N. Panama	No species hitherto known.
S. Panama	,,
Venezuela	*subcallosa.*

The Mexican and Central-American species may be arranged as follows:—

A. Sculptæ (*Streptostyla*, s. str., Albers): sculptured .	*nicoleti, botteriana, dubia.*
B. Politæ (*Chersomitra*, v. Mart.): polished.	
a. Nigricantes: with black bands	*nigricans, mitræformis.*
b. Olivæformes: oblong-ovate, obtuse at both ends .	*delattrei, irrigua, shuttleworthi, cylindracea.*
c. Coniformes: oblong-ovate, attenuated below . .	*coniformis, conulus.*
d. Turgidæ: ovate, swollen in the middle	*obesa, turgidula, labida, lurida.*
e. Physæformes: subovate, with longer tapering spire.	*delibuta, ventricosula, thomsoni, viridula, plicatula, biconica, flavescens, fulvida, glandiformis, physodes, limnæiformis, oblonga.*
f. Aplectæformes: subcylindrical, with rather long spire; size small.	*sololensis, meridana, dysoni, vexans, boyeriana.*
g. Subturritæ: still more elongate; size small . .	*sargi, mohriana.*
C. Ligulatæ (*Petenia*, Cr. & Fisch.): a mucous-pore at the foot.	*ligulata,* ? *catenata.*

A. *Sculptæ.*

[*Streptostyla*, sensu stricto, v. Martens, in Albers's Die Helic. ed. 2, p. 33 (1860).]

1. Streptostyla nicoleti.

Spiraxis (*Streptostyla*) *nicoleti*, Shuttl. in Bern Mittheil. 1852, p. 204 (Diagn. no. 2, p. 24) [1]; Notitiæ Malac. ii. p. 14, t. 5. fig. 1 (1877) [2].

Spiraxis nicoleti, Pfr. Monogr. Helic. Vivent. iii. p. 477 [3].

Achatina nicoleti (Shuttl.), Pfr. in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, *Achatina*, no. 47, p. 325, t. 26. figg. 18, 19 [4].

Streptostyla nicoleti (Shuttl.), Fischer & Crosse, Miss. Scient. Mex., Mollusca, i. p. 23 [5]; Strebel, Beitr. Mex. Land- und Süssw.-Conch. iii. pp. 6, 12–14, t. 7. figg. 2, 2 *a–f*, p. 49, t. 22. figg. 3, 3 *a–d* (living animal), t. 3 (anatomy), t. 6. fig. 1 (radula) [6].

Hab. E. Mexico: Misantla, San Isidro, and San Juan Miahuatlan, woody hills, on decayed trunks of trees, solitary (*Strebel* [6]); Misantla and Coatepec (*Höge*); Jalapa (*M. Trujillo*); Cordova (*Jacot-Guillarmod* [1–4]).

Var. *subovata*.

Streptostyla nicoleti, Fischer & Crosse, loc. cit. t. 1. figg. 2, 2 *a* [7].

Streptostyla nicoleti, Form B, Strebel, loc. cit. p. 14, t. 7. fig. 3 [8].

Hab. E. Mexico: Toxpam, near Cordova (*Sallé* [5]); Orizaba (*Botteri* [8]).

2. Streptostyla botteriana.

Streptostyla botteriana, Crosse & Fischer, in Journ. de Conch. xvii. p. 190 (1869) [1]; Fischer & Crosse, Miss. Scient. Mex., Mollusca, i. p. 25, t. 2. figg. 4, 4 *a*, *b* [2].

Hab. E. Mexico: Orizaba (*Botteri* [1 2]).

Comparative Table of the Species of *Streptostyla*.

Nomen.	Figura.	Superficies.	Sutura.	Columella.	Margo ext.	Apertura.	Long.	Diam.	Alt.	Patria.
nicoleti, *Shuttl.*	coniformis.	costulata, sericea, fulvo-castanea, concolor.	angulata.	valida, angulata.	leviter arcuatus, albus, medio impressus.	$\frac{2}{3}$ $\frac{1}{2}$ $\frac{3}{5}$	mm. 40 40 35	mm. 19 17 18	mm. 27 27 24	E. Mexico.
——, var. subovata, *v. Mart.*	subovata.	,,	,,	valida, subangulata.	vix arcuatus, albus, vix impressus.	$\frac{2}{5}$	30	14	19	E. Mexico.
botteriana, *Cr. & Fisch.* ...	subturrita, angulosa, medio impressa.	,,	impressa.	valida.	flexuosus, medio impressus.	$\frac{2}{3}$	$8\frac{1}{2}$	3	$3\frac{1}{2}$	E. Mexico.
dubia, *Pfr.*	subturrita, oblonga.	conferte plicata, corneo-albida, varicibus fuscis.	simplex, profundiuscula.	tenuis, substricta.	leviter arcuatus.	$\frac{1}{3}$	$9\frac{1}{3}$	4	3	Chiapas.
nigricans, *Pfr.*	oblongo-ovata.	nigricans, sutura, basi et strigis flavis.	,,	parum torta, validiuscula, subtruncata.	parum flexuosus, tenuis.	$\frac{2}{5}$ $\frac{5}{9}$	$43\frac{1}{2}$ 39	19 17	25 20	Tabasco, N. Guatemala.
mitræformis, *Shuttl.*	fusiformi-ovata.	castanea, basi (et sutura) luteis.	,,	,,	,,	$\frac{4}{7}$ $\frac{1}{2}$	22 17	9 7	13 9	E. Mexico, N. Guatemala, Costa Rica.
delattrei, *Pfr.*	subcylindrica.	lutea, strigis fuscis.	simplex, albida.	crassula, non truncata.	subrectus.	$\frac{2}{3}$ $\frac{5}{7}$	42 40 31	16 14 12	29 29 23	N. & E. Guatemala.
——, var. edwardsiana, *Cr. & F.*	,,	,,	late marginata.	,,	,,	$\frac{2}{5}$	36	13	23	E. Mexico.
——, var. sallæi, *Cr. & F.*	,,	lutea, strigis pallidis.	simplex.	sat tenuis.	,,	$\frac{2}{5}$	40	15	$24\frac{1}{2}$	E. Mexico.
irrigua, *Shuttl.*	cylindraceo-glandiformis.	lutescens, strigis obsoletis.	simplex, costulata.	sat tenuis, subtruncata.	leviter flexuosus.	$\frac{5}{8}$	24	10	15	E. Mexico.
——, var. cingulata, *Cr. & Fisch.*	,,	,,	,,	,,	,,	$\frac{5}{7}$	25	10	19	E. Mexico.

shuttleworthi, *Pfr.*	obese subcylindrica.	aurantio-fulva, concolor.	alba, subirregularis.	crassula, subtruncata.	leviter arcuatus.	$\frac{5}{7}$ - $\frac{2}{3}$	36	15	27	E. Mexico; Chiapas.
——, var. ventricosa, *v. Mart.*	ventricosa.	,,	,,	,,	,,	$\frac{2}{3}$-$\frac{3}{4}$	34 31	14½ 14	22 24	E. Mexico.
——, var. similis, *Streb.* .	attenuato-cylindrica.	,,	,,	,,	,,	$\frac{2}{3}$	35	14	25	E. Mexico.
——, var. quirozi, *Streb.* .	piriformi-cylindrica.	,,	,,	,,	,,	$\frac{3}{4}$	20	9½	16½	E. Mexico.
cylindracea, *Pfr.*	subcylindrica.	lutescenti-cornea.	linea alba subsuturali ornata.	torta, subtruncata.	arcuatus.	$\frac{3}{4}$ - $\frac{5}{7}$	13	5½	10½	E. Mexico N. Guatemala?, Central America, Costa Rica.
coniformis, *Shuttl.*	coniformi-cylindrica.	flava, substrigata.	simplex, subirregularis.	crassa, valde torta.	leviter flexuosus.	$\frac{3}{4}$	27 20	11 8	21½ 16	E. Mexico.
——, var. pfeifferi, *Fisch.*	subfusiformi-cylindrica.	,,	,,	,,	arcuatus.	$\frac{5}{7}$	19	8	13½	Mexico.
conulus, *v. Mart.*	anguste coniformis.	lutea.	simplex, albida.	,,	leviter arcuatus.	$\frac{2}{3}$	14	5	9½	W. Mexico.
obesa, *v. Mart.*	fere ovata.	aurantio-flava, unicolor.	alba, submarginata.	leviter torta.	distincte arcuatus.		38	18	18	Honduras.
turgidula, *Pfr.*	biconico-ovata.	pallide flava, strigis raris pallide fuscis, superne striatula.	alba, simplex.	crassula, subtruncata.	,,	$\frac{5}{6}$ - $\frac{3}{5}$	31 25	12½ 11	18½ 16	E. Mexico.
——, var. guatemalensis, *Fisch. & Crosse*	,,	,,	,,	,,	,,	$\frac{5}{9}$ - $\frac{4}{7}$	41 39	17 15½	22 22	N. & S. Guatemala.
labida, *Morel.*	,,	corneo-flava, strigata.	marginata.	,,	,,	$\frac{3}{5}$	22	10½	13	N. Guatemala.
lurida, *Shuttl.*	subovata.	fusco-cornea.	subcanaliculata.	substricta, tenuis.	,,	$\frac{2}{3}$	13½ 15 18	6½ 8 8⅓	9 9½ 12	E. Mexico, N. Guatemala.
——, var. major, *v. Mart.*	,,	,,	,,	,,	,,	$\frac{2}{3}$	23	10½	16	Chiapas, Guatemala.
delibuta, *Morel.*	fusiformi-oblonga.	corneo-virens vel pallide flavidula, levissime striatula.	marginata.	crassiuscula, subtruncata.	,,	$\frac{5}{8}$	26	11	16	N. & E. Guatemala.
——, var. crassa, *Streb.* ...	oblongo-ovata.	fulva, leviter striatula.	marginata, appressa.	crassula, valde torta.	,,	$\frac{3}{5}$	26 20	12 11	16 12½	Guatemala.

COMPARATIVE TABLE OF THE SPECIES OF *STREPTOSTYLA* (*continued*).

Nomen.	Figura.	Superficies.	Sutura.	Columella.	Margo ext.	Apertura.	Long.	Diam.	Alt.	Patria.
ventricosula, *Morel.*	ovato-oblonga.	pallide flava, nitida.	simplex.	crassula, parum torta.	leviter arcuatus.	$\frac{3}{5}$	mm. 12	mm. 6	mm. 8	Yucatan.
——, var. binneyana, *Cr. & Fisch.*	,,	olivaceo-cornea (albido-guttulata).	,,	tenuicula, parum torta.	,,	$\frac{3}{5}$	$18\frac{1}{2}$	8	$11\frac{1}{2}$	Central Guatemala, Costa Rica.
thomsoni, *Ancey*	subfusiformis.	succineo - luteola, strigosa.	marginata.	crassa.	distincte arcuatus.	$\frac{1}{2}$	30	12	14	Honduras.
viridula, *Ang.*	ovata.	pallide viridula, superne striatula.	subcanaliculata.	valde torta, truncata.	vix arcuatus.	$\frac{3}{5}$	20	$12\frac{1}{2}$	12	Costa Rica.
plicatula, *Streb.*	,,	flava, superne striata.	simplex.	leviter torta.	subrectus.	$\frac{2}{3}$	19	9	13	E. Mexico.
biconica, *Pfr.*	biconico-fusiformis.	pallide rubenti-cornea.	marginata.	valde torta, tenuicula.	distincte arcuatus.	$\frac{4}{7}$	$13\frac{1}{2}$ 12	6 $3\frac{1}{2}$	8 $6\frac{1}{2}$	Chiapas.
flavescens, *Shuttl.*	ovato-oblonga.	pallide flavida, strigis obsoletis.	"crenulata."	substricta, tenuis.	leviter arcuatus.	$\frac{5}{8}$	16	8	11	E. & S.W. Mexico, Costa Rica.
——, var. boucardi, *Pfr.*	,,	olivaceo-fusca vel rubello-cornea.	"levis."	"funicularis."	,,	$\frac{4}{7}$	17	7	$10\frac{1}{2}$	S.W. Mexico.
fulvida, *Cr. & Fisch.*	oblonga.	fusco-fulvida, parum nitida.	marginata, albida.	subincrassata, sat torta.	,,	$\frac{3}{5}$	16	7	$9\frac{1}{2}$	E. Mexico.
glandiformis, *Cr. & Fisch.*	ovato-oblonga.	pallide olivaceo-cornea, strigata.	,,	strictiuscula, subincrassata.	,,	$\frac{3}{5}$	16	7	9	E. Mexico.
physodes, *Shuttl.*	ovato-fusiformis.	flavida, pellucida.	submarginata, colorata.	crassula, sat torta.	distincte arcuatus.	$\frac{4}{7}$	10 13	$4\frac{1}{2}$ $5\frac{1}{2}$	$6\frac{1}{2}$ $7\frac{1}{2}$	E. Mexico.
——, var. auriculacea, *Pfr.*	fusiformi-oblonga.	rubello-cornea, pellucida.	marginata.	,,	,,	$\frac{4}{7}$	16	6	9	E. Mexico.

limnæiformis, *Shuttl.*	fusiformi-oblongo-ovata.	pallide flavescens, strigata.	"leviter crenulata."	subincrassata, sat torta.	leviter arcuatus.	$\frac{4}{7}$	17	7	9	E. Mexico.
——, var. parvula, *Pfr.* ...	„	cornea, pellucida.	(rufo-marginata).	subincrassata, torta.	arcuatus.	$\frac{4}{7}$	8	4	$4\frac{1}{2}$	Chiapas.
oblonga, *Pfr.*	oblonga.	carnea.	late marginata.	"alte torta."	modice arcuatus.	$\frac{6}{11}$	$9\frac{2}{3}$	$4\frac{1}{2}$	5	Chiapas.
sololensis, *Cr. & Fisch.* ...	ovato-cylindrica.	flava.	simplex, alba.	crassula, modice torta.	leviter arcuatus.	$\frac{3}{5}$	$18\frac{1}{2}$	7	11	Central Guatemala.
meridana, *Morel*.....	ovato-oblonga, subcylindrica.	pellucida, fulva.	submarginata, concolor.	„	„	$\frac{7}{13}$	$11\frac{1}{2}$	$4\frac{1}{2}$	$6\frac{1}{2}$	Yucatan.
——, var. cobanensis, *Tristr.*	„	flava, pellucida.	simplex.	„	„	$\frac{4}{7}$	14 13	5 $5\frac{1}{3}$	8 7	N. Guatemala.
——, var. major, *v. Mart.*	„	„	„	„	„	„	16	6	$9\frac{1}{2}$	S. Guatemala.
dysoni, *Pfr.*	oblongo-conica.	lutescenti-cornea.	„	crassula.	distincte arcuatus.	$\frac{3}{5}$	9	4	$5\frac{1}{2}$	Honduras, Nicaragua.
vexans, *Streb.*	cylindrico-oblonga.	pallide flava, pellucida.	marginata diaphana.	substricta.	modice arcuatus.	$\frac{5}{9}$	$8\frac{1}{2}$	3	$4\frac{3}{4}$	E. Mexico.
boyeriana, *Cr. & Fisch.* ...	anguste biconico-fusiformis.	pallide olivaceo-cornea.	subirregularis, lutescens.	subincrassata.	„	$\frac{3}{5}$	14	$5\frac{1}{2}$	$9\frac{1}{3}$	E. Mexico.
sargi, *Cr. & Fisch.*	subturrita.	fulva, substrigata.	marginata.	substricta.	leviter arcuatus.	$\frac{3}{7}$	12 13 15	5 5 $5\frac{1}{2}$	$5\frac{1}{3}$ 6 7	N. Guatemala.
mohriana, *Pfr*.....	subcylindrica.	corneo-hyalina.	„	subincrassata, leviter torta.	?	$\frac{7}{15}$	$7\frac{1}{2}$	$2\frac{1}{2}$	$3\frac{1}{2}$	E. Mexico.
ligulata, *Morel*.....	elongato-fusiformis.	virenti-flava, fascia mediana continua.	submarginata.	crassula.	subarcuatus.	$\frac{5}{11}$	16	6	$7\frac{1}{2}$	E. Mexico, Central Chiapas, N. Guatemala.
catenata, *Pfr.*	fusiformi-oblonga.	pallide flava, fascia fusca interrupta.	simplex, fusca.	„	modice arcuatus.	$\frac{4}{7}$	11	4	6	Chiapas.

3. **Streptostyla dubia.** (Tab. V. fig. 10.)

Spiraxis dubia, Pfr. P. Z. S. 1856, p. 378 [1]; Malak. Blätt. 1856, p. 232 [2]; Monogr. Helic. Vivent. iv. p. 580 [3].

Streptostyla dubia (Pfr.), Fischer & Crosse, Miss. Scient. Mex., Mollusca, i. p. 65 [4].

Hab. Chiapas (*Ghiesbreght* [1–4]).

Costulated as in the first two species, but not of the same uniform colouring.

I am indebted to Mr. Edgar Smith for a figure (fig. 10) and exact measurements of this aberrant shell.

B. *Politæ.*

[*Chersomitra*, v. Martens, in Albers's Die Helic. ed. 2, p. 33 (1860).]

a. *Nigricantes.*

4. **Streptostyla nigricans.**

Glandina nigricans, Pfr. P. Z. S. 1845, p. 75 [1]; Albers, Die Helic. p. 197 (1850) [2].

Achatina (*Glandina*) *nigricans*, Pfr. Monogr. Helic. Vivent. ii. p. 280 [3].

Achatina nigricans, Reeve, Conch. Icon. vi., *Achatina*, t. 14. fig. 54 [4]; Deshayes, in Férussac's Hist. Nat. Moll. Terr. ii. p. 179, t. 137. figg. 9, 10 [5].

Spiraxis nigricans (Pfr.), Shuttl. in Bern Mittheil. 1852, p. 204 (Diagn. no. 2, p. 24) [6]; Notitiæ Malac. ii. p. 14, t. 5. fig. 2 [7]; Tristram, P. Z. S. 1863, p. 418 [8].

Streptostyla nigricans, Fischer & Crosse, Miss. Scient. Mex., Mollusca, i. p. 60, t. 1. figg. 15, 15 *a* (living animal) [9]; v. Mart. P. Z. S. 1875, p. 647 [10]; Strebel, Beitr. Mex. Land- und Süssw.-Conch. iii. p. 24, t. 9. figg. 3, 3 *a*, t. 12. fig. 11 [11]; Jousseaume, Bull. Soc. Zool. Fr. iii. p. 169 (1878) [12].

Hab. Tabasco (var. minor, *coll. Cuming* [9]).

N. Guatemala: Alta Vera Paz (*Bocourt* [9]); near Lake Peten (*Salvin* [8 9]); Coban (*Salvin* [11], *Sarg* [11], *Conradt*); Vera Paz (*Boucard* [12]).

The locality Vera Cruz given by Pfeiffer [1 2] on the authority of Delattre, and repeated by Shuttleworth [6], is very probably an error, being perhaps a misprint for Vera Paz. A confusion may have arisen with the following species, as *S. nigricans* has not been found in the State of Vera Cruz by any of the numerous later collectors.

5. **Streptostyla mitræformis.**

Spiraxis mitræformis, Shuttl. in Bern Mittheil. 1852, p. 205 (Diagn. no. 2, p. 25) [1]; Notitiæ Malac. ii. p. 14, t. 5. fig. 3 [2]; Pfr. Monogr. Helic. Vivent. iii. p. 473 [3].

Streptostyla mitræformis (Shuttl.), Fischer & Crosse, Miss. Scient. Mex., Mollusca, i. p. 62, t. 1. figg. 16, 16 *a* [4].

Var. minor.

Streptostyla mitræformis (Shuttl.), Strebel, Beitr. Mex. Land- und Süssw.-Conch. iii. p. 25, t. 9. fig. 5 [5].

Hab. E. Mexico: Cordova (*Jacot-Guillarmod* [1 2 3]); Toxpam, near Cordova (*Sallé* [4]).

N. Guatemala: Coban (*Sarg* [5]).
Costa Rica (*Rogers*, var.); Rancho Redondo, 1600 metres above the sea (*P. Biolley*: var.).

Very near the preceding, but smaller and comparatively more narrow, the spire longer; generally the dark colour is more uniform, less interrupted by yellow streaks. In some specimens the yellow zone at the suture is wanting; in others it is proportionately as well developed as in *S. nigricans*.

b. *Olivæformes*.

6. **Streptostyla delattrei.**

Achatina lattrei, Pfr. P. Z. S. 1845, p. 138 [1]; Monogr. Helic. Vivent. ii. p. 269 [2]; Reeve, Conch. Icon. vi., *Achatina*, t. 14. fig. 53 [3].
Glandina lattrei, Morelet, Journ. de Conch. iii. p. 40 [4].
Spiraxis (*Streptostyla*) *lattrei*, Shuttl. in Bern Mittheil. 1852, p. 205 (Diagn. no. 2, p. 25) [5].
Spiraxis lattrei, Tristram, P. Z. S. 1861, p. 230 [6].
Streptostyla delattrei, Fischer & Crosse, Miss. Scient. Mex., Mollusca, i. p. 33, t. 1. figg. 5, 5 *a*, *b* [7]; v. Mart. P. Z. S. 1875, p. 648 [8]; Strebel, Beitr. Mex. Land- und Süssw.-Conch. iii. p. 21, t. 8. figg. 10, 10 *a–c*, & t. 12. fig. 10 [9].
Glandina oliva, Morelet, Test. Noviss. i. p. 13 (1849) [10].

Hab. N. Guatemala: Vera Paz, in the woods (*Morelet* [7 9 10]); Panzos, Vera Paz (*Bocourt* [7 9]); Coban (*Salvin* [8 9], *Bocourt* [7], *Sarg* [9]); Senahu 2800 feet and Panzos, both in the Polochic valley (*Champion*); Alta Vera Paz (*Boucard*).
E. Guatemala: Yzabal, on the borders of the Golfo Dulce (*Stoll*).

Somewhat variable in size, form, and colour. The longitudinal streaks are often dark chestnut, but sometimes very faint and scarcely indicated, sometimes solitary and sometimes two close together; generally they are fewer and more faint on the second half of the last whorl. The aperture occupies rather more or less than two thirds of the whole length of the shell.

Var. *edwardsiana*.
Streptostyla edwardsiana, Crosse & Fischer, in Journ. de Conch. xvii. p. 29 (1869) [11]; Fischer & Crosse, Miss. Scient. Mex., Mollusca, i. p. 35, t. 2. figg. 2, 2 *a* [12]; Pfr. Monogr. Helic. Vivent. viii. p. 338 [13]; Strebel, Beitr. Mex. Land- und Süssw.-Conch. iii. p. 20 [14].

Hab. E. Mexico: Orizaba (*Sallé* [11–14]).

Only distinguished by the suture being marked with an impressed line, which in other genera is a good specific character; but, as in other respects no real difference is to be found, I agree with Strebel that it may be accidental. Strebel figures, however, as probably belonging to *S. edwardsiana*, young specimens (t. 8. fig. 7), which have neither the "sutura marginata" nor the dark streaks of Crosse and Fischer's species.

Var. *sallæi.*

Streptostyla sallei, Crosse & Fischer, in Journ. de Conch. xvii. p. 30 (1869) [15]; Fischer & Crosse, Miss. Scient. Mex., Mollusca, i. p. 36, t. 2. figg. 1, 1 *a* [16]; Pfr. Monogr. Helic. Vivent. viii. p. 338 [17]; Strebel, Beitr. Mex. Land- und Süssw.-Conch. iii. p. 20, t. 8. fig. 4, & t. 12. fig. 20 [18].

Hab. E. Mexico: Orizaba (*Sallé* [15–17]); Mirador or Orizaba (*Strebel* [18]); Mexico, without nearer indication of locality (*ex Cuming*, in the collection of the late Mr. Albers, now in the Berlin Museum [17]).

In vain I have endeavoured to make out clear differences between the Mexican *S. sallæi* and the Guatemalan *S. delattrei*. In the descriptions quoted above, and in the specimen in the Berlin Museum (which is recognized as *S. sallæi* by Strebel), I find no other characters than a somewhat thinner and less narrow shell, a proportionately rather longer spire (aperture to the whole length =5 : 8), paler streaks, and a somewhat thinner columella. But in all these points there is so much variation among the Guatemalan specimens of *S. delattrei* that the peculiarities of *S. sallæi* are included within their limits.

7. **Streptostyla irrigua.**

Spiraxis irrigua, Shuttl. in Bern Mittheil. 1852, p. 205 (Diagn. no. 2, p. 25) [1]; Notitiæ Malac. ed. 2, p. 25, t. 5. fig. 5 [2]; Pfr. Monogr. Helic. Vivent. iii. p. 47 [3].

Streptostyla irrigua, Fischer & Crosse, Miss. Scient. Mex., Mollusca, i. p. 37 [4].

Var. *cingulata.*

Streptostyla cingulata, Crosse & Fischer, in Journ. de Conch. xvii. p. 31 (1869) [5]; Fischer & Crosse, loc. cit. p. 40, t. 1. figg. 6, 6 *a* [6]; Pfr. Monogr. Helic. Vivent. viii. p. 338 [7].

Hab. E. Mexico: Cordova (*Jacot-Guillarmod* [1–4]); Tuxtla, State of Vera Cruz (*Sallé* [5–7]).

Intermediate between *S. delattrei* and *S. coniformis*. A comparison of the figures given by Shuttleworth and Fischer and Crosse shows that *S. irrigua* and *S. cingulata* are probably one and the same species. Fischer and Crosse could not have seen Shuttleworth's figure when they described his species; *S. cingulata* seems to differ only by a somewhat more decided sculpture near the suture.

8. **Streptostyla shuttleworthi.** (*S. bullacea*, Tab. V. fig. 11; probably the young state of this species.)

Spiraxis shuttleworthi, Pfr. P. Z. S. 1856, p. 320, t. 35. fig. 8 [1]; Novitat. Conch. i. p. 102, t. 29. figg. 1, 2 [2]; Monogr. Helic. Vivent. iv. p. 576 [3].

Streptostyla shuttleworthi (Pfr.), Fischer & Crosse, Miss. Scient. Mex., Mollusca, i. p. 41, t. 1. figg. 7, 7 *a*, & t. 2. fig. 4 [4]; Strebel, Beitr. Mex. Land- und Süssw.-Conch. iii. pp. 6, 18, t. 8. fig. 9 [5].

Hab. E. Mexico: Misantla and environs, in the woods, crawling on decayed leaves, more rarely on the leaves of shrubs (*Strebel* [5]); Cordova (*Sallé* [1–4]); Orizaba (*Sallé* [4]).

Chiapas (*Ghiesbreght* [3]).

Tabasco: Teapa (*H. H. Smith*).

Var. *ventricosa.*

Streptostyla shuttleworthi, var. γ, Fischer & Crosse, loc. cit. p. 42, t. 2. fig. 3 [6].

Streptostyla shuttleworthi, var., Strebel, loc. cit. iii. t. 8. fig. 9 *a* [7].

Hab. E. Mexico: Orizaba (*Sallé* [6]); Nautla, near the sea-shore, dead specimens (*Strebel* [7]).

Var. *similis.*

Streptostyla similis, Strebel, loc. cit. iii. pp. 19, 50, t. 8. fig. 8, t. 12. fig. 7 [8].

Hab. E. Mexico: Misantla (*Strebel* [8]); Orizaba (*Botteri* [8]); Vera Cruz (*Shuttleworth, in mus. Berol.* [8]).

S.W. Mexico: Juquila (*Höge*).

Var. *quirozi.*

Streptostyla brevispira, Strebel, loc. cit. iii. p. 21, t. 8. fig. 3 [9].

Hab. E. Mexico: Tezuitlan and Misantla (*Höge*); Coatepec (*Quiroz* [9]); Miahuatlan (*Doña Estefania* [9]); San Antonio del Monte (*Strebel*).

Rather variable in size and form, but constantly of a brilliant reddish-fawn-colour; vertical streaks faint or wanting; columella rather thin and slightly twisted. Large specimens approach *G. delattrei*, var. *sallæi.*

Spiraxis bullacea, Pfr. [Malak. Blätt. xiii. p. 84 (1866); Monogr. Helic. Vivent. vi. p. 196], from Tabasco, is according to the original specimen (Tab. V. fig. 11) very probably only the young state of this species.

9. **Streptostyla cylindracea.** (Tab. V. fig. 13.)

Achatina cylindracea, Pfr. P. Z. S. 1846, p. 31 [1]; Monogr. Helic. Vivent. ii. p. 269 [2]; Reeve, Conch. Icon. vi., *Achatina,* t. 18. fig. 91 [3].

Spiraxis cylindracea (Pfr.), Shuttl. in Bern Mittheil. 1852, p. 206 (Diagn. no. 2, p. 26) [4]; Pfr. Monogr. Helic. Vivent. iii. p. 475 [5].

Streptostyla cylindracea (Pfr.), Fischer & Crosse, Miss. Scient. Mex., Mollusca, i. p. 30 [6]; Angas, P. Z. S. 1879, p. 482 [7].

Spiraxis shuttleworthii (Pfr.), Tristr. P. Z. S. 1861, p. 230 [8].

Hab. E. Mexico: Cordova (*Jacot-Guillarmod* [4 6]).

N. Guatemala (*Salvin* [8]).

? S.E. Costa Rica (*Gabb* [7]).

Central America: Tortilla (ubi ?: *coll. Cuming* [1 2 3]).

The suture itself is whitish and below it a fine white spiral line is to be seen, which is not impressed, and appears on closer examination to be produced by an internal thickening of the shell in the uppermost part of the lumen within each whorl.

The specimen marked "*Spiraxis cylindracea*" in Pfeiffer's collection, now in the possession of H. Dorhn in Stettin (fig. 13), exceeds remarkably the dimensions given in

the original description, measuring 18 millim. in length, 8 in breadth, and 14 in length of the aperture, instead of 13, $5\frac{1}{2}$, and $10\frac{1}{2}$ respectively; the subsutural white line is seen only on its upper whorls, not on the last.

c. *Coniformes.*

10. **Streptostyla coniformis.** (Tab. V. fig. 14, young specimen.)

Spiraxis coniformis, Shuttl. in Bern Mittheil. 1852, p. 206 (Diagn. no. 2, p. 26) [1]; Notitiæ Malac. ed. 2, p. 15, t. 5. fig. 6 [2]; Pfr. Monogr. Helic. Vivent. iii. p. 474 [3].

Streptostyla coniformis (Shuttl.), Fischer & Crosse, Miss. Scient. Mex., Mollusca, i. p. 43 [4]; Strebel, Beitr. Mex. Land- und Süssw.-Conch. iii. pp. 6, 15, t. 8. figg. 6, 6 *a*, *b* (shell), t. 9. fig. 12 (living animal), t. 6. fig. 3 (radula), t. 4. figg. 11–13 (anatomy) [5].

Streptostyla blandina, Crosse & Fischer, Journ. de Conch. xvii. p. 31 (1869) [6]; Fischer & Crosse, Miss. Scient. Mex., Mollusca, i. p. 28, t. 1. figg. 8, 8 *a* [7]; Pfr. Monogr. Helic. Vivent. viii. p. 342 [8].

Hab. E. Mexico: Cordova (*Jacot-Guillarmod* [1–4], *Sallé* [6–8]); Mirador (*Strebel* [5], *Sartorius* [5], *Berendt* [5]); Coatepec (*Doña Estefania* [5]); Orizaba (*Botteri* [5]).

Var. *pfeifferi*: spira elatiore.

Achatina streptostyla, Pfr. in Zeitschr. für Malak. 1846, p. 159 [9]; Monogr. Helic. Vivent. ii. p. 269 [10]; Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, *Achatina*, no. 66, p. 338, t. 37. figg. 3, 4 [11].

Glandina streptostyla (Pfr.), Morelet, Journ. de Conch. iii. p. 41 [12].

Spiraxis streptostyla (Pfr.), Shuttl. in Bern Mittheil. 1852, p. 206 (Diagn. no. 2, p. 26) [13].

Streptostyla pfeifferi, Fischer & Crosse, Miss. Scient. Mex., Mollusca, i. p. 27 [14]; Pfr. Monogr. Helic. Vivent. viii. p. 341 [15].

Hab. Mexico: without nearer indication of locality (*Liebmann* [9–15]).

S. pfeifferi seems at first sight to be fairly distinguished from *S. coniformis* by the length of the spire (aperture to the whole length in *S. coniformis*=6 : 7, in *S. pfeifferi* =2 : 3, according to the original descriptions), the thinner shell, and the presence of dark streaks; but if we take into consideration the specimens described and figured by Strebel, one of which (fig. 6 *b*) is in the Berlin Museum, these differences lose their value by gradual transitions. The original specimen in Pfeiffer's collection is really rather thin; but the author himself subsequently placed by the side of it, under the same name, a quite solid example, which in size and in the comparative length of the spire is intermediate between *S. pfeifferi* and *S. coniformis*, viz. 21 millim. long, 9 broad, aperture $14\frac{1}{2}$ millim.

11. **Streptostyla conulus,** sp. n. (Tab. V. fig. 15.)

Testa anguste coniformis, solida, levissime striatula, flava, nitida; spira mediocris, obese conica, apice obtusiuscula; anfr. 7, convexiusculi, penultimus antepenultimo duplo altior, ultimus deorsum angustatus, ad aperturam non deflexus; sutura simplex, fasciola pallide grisea (non sulco) notata; apertura anguste

linearis, infra paullulum dilatata, margine externo infra medium leviter antrorsum arcuato, columella crassa, valde torta, aperta.

Long. 14, diam. 5 ; apert. long. $9\frac{1}{2}$, diam. superne $\frac{2}{3}$, infra $1\frac{1}{2}$ millim.

Hab. W. Mexico : Sayula, State of Jalisco (*Höge*).

Only one specimen. Resembles in many points *S. coniformis*, but is much smaller and yet very thick (so that it cannot be young) ; it is also considerably more slender, with proportionately longer spire. For comparison, a young specimen of *G. coniformis* is figured (fig. 14).

d. *Turgidæ.*

12. **Streptostyla obesa,** sp. n. (Tab. V. figg. 12, 12 *a*.)

Testa oblongo-ovata, leviter striatula, nitida, aurantio-flava, unicolor ; sutura submarginata, anguste alba ; spira conica, acutiuscula ; anfr. $8\frac{1}{2}$, regulariter crescentes, leviter convexi ; apertura dimidiam testæ altitudinem superans, oblique lanceolata, margine externo inferius antrorsum arcuato, columella subperpendiculari, leviter torta.

Long. 38, diam. 18 ; apert. long. 18, diam. 9 millim.

Hab. Honduras : from a shell-dealer (*Mus. Berol.*).

Nearly allied to *S. turgidula*, Pfr., but distinctly broader (diameter equal to the length of the aperture); coloration more orange, and without darker varices ; the suture also in the last whorl is regular, not indented by stoppages of growth, and the white colour of the suture itself more conspicuous. I have seen only one specimen.

13. **Streptostyla turgidula.**

Spiraxis turgidula, Pfr. P. Z. S. 1856, p. 320, t. 35. fig. 9 [1]; Novitat. Conch. i. p. 102, t. 29. figg. 3, 4 [2]; Monogr. Helic. Vivent. iv. p. 577 [3]; Fischer & Crosse, Miss. Scient. Mex., Mollusca, i. p. 58, t. 1. fig. 4 [4]; Strebel, Beitr. Mex. Land- und Süssw.-Conch. iii. p. 17, t. 12. fig. 6 [5].

Hab. E. Mexico : Cordova (*Sallé* [1–4]); Jalapa (*Doña Estefania* [5]).

Var. *guatemalensis.*

Streptostyla turgidula, var. *guatemalensis,* Fischer & Crosse, loc. cit. p. 59, t. 1. fig. 4 *a* [6].

Streptostyla schneideri, Strebel, loc. cit. iii. p. 26, t. 9. fig. 1 [7].

Streptostyla ——, Stoll, Guatem. Reisen und Schild. aus den Jahr. 1878–1883, p. 199 [8].

Hab. N. Guatemala : Coban (*Sarg* [7]).

S. Guatemala : San Agustin * (*Bocourt* [6]) ; Hacienda Helvetia 3000 feet, Hacienda Buenavista 3500 feet, both in Upper Cholhuitz, and Hacienda Germania near

* There are several places of this name in Guatemala ; the one on the Pacific slope is probably intended, one at least of Bocourt's species being recorded from the " San Agustin, Dep. of Solola."

San Felipe, 2000 feet above the sea, all three in Costa Cuca, and on the slope of the central plateau towards the Pacific, Dep. Retalhuleu (*Stoll* [8]).

Costa Rica: a somewhat imperfect specimen collected by van Patten (*Mus. Berol.*, no. 21859).

In this species, as in *S. delattrei*, the Mexican specimens are smaller and more faintly coloured than the Guatemalan ones. But in *S. turgidula* the Mexican examples were first described, in *S. delattrei* the Guatemalan ones; so we have a *S. delattrei* from Guatemala, with var. (minor) *sallæi* from Mexico, and a *S. turgidula* from Mexico, with var. (major) *guatemalensis*.

14. **Streptostyla labida.** (Tab. V. fig. 16.)

Glandina labida, Morelet, Test. Noviss. ii. p. 13 (1851) [1].
Achatina (*Glandina*) *labida* (Morel.), Pfr. Monogr. Helic. Vivent. iii. p. 508 [2].
Oleacina labida (Morel.), Gray, Cat. Pulm. p. 19 [3]; Pfr. Monogr. Helic. Vivent. iv. p. 634 [4].
Streptostyla labida (Morel.), Fischer & Crosse, Miss. Scient. Mex., Mollusca, i. p. 45 [5].

Hab. N. Guatemala: Vera Paz, in the woods (*Morelet* [1–5]).

Very near the preceding, but comparatively somewhat shorter and marked with a distinctly impressed line below the suture. Figured from a typical specimen sent to me by M. A. Morelet.

15. **Streptostyla lurida.**

Spiraxis lurida, Shuttl. in Bern Mittheil. 1852, p. 205 (Diagn. no. 2, p. 25) [1]; Notitiæ Malac. ii. t. 5. fig. 4 [2]; Pfr. Monogr. Helic. Vivent. iii. p. 473 [3].
Spiraxis ——, Tristram, P. Z. S. 1861, p. 231 [4].
Streptostyla lurida, Fischer & Crosse, Miss. Scient. Mex., Mollusca, i. p. 48, t. 2. figg. 6, 6 *a*, *b* [5].
Streptostyla bocourti, Crosse & Fischer, Journ. de Conch. xvii. p. 34 (1869) [6]; Fischer & Crosse, Miss. Scient. Mex., Mollusca, i. p. 47, t. 1. figg. 14, 14 *a* [7]; v. Mart. P. Z. S. 1875, p. 648 [8]; Pfr. Monogr. Helic. Vivent. viii. p. 340 [9]; Strebel, Beitr. Mex. Land- und Süssw.-Conch. iii. p. 24, t. 8. figg. 1, 1 *a*, *b* (and fig. 5 ?) [10].

Hab. E. Mexico: Cordova (*Jacot-Guillarmod* [1 3 5]); Pacho, in the woods (*Doña Estefania* [10]); Orizaba (*Botteri* [5]).
Tabasco: San Juan Bautista, on the banks of the R. Grijalva (*H. H. Smith*).
N. Guatemala: Coban (*Bocourt* [6 7], *Salvin* [8], *Sarg* [10]).

Var. major.

Streptostyla bocourti, var. γ, Fischer & Crosse, loc. cit. [11]; Pfr. Monogr. Helic. Vivent. viii. p. 340 [12].
Streptostyla bocourti, vars. B, C, Strebel, loc. cit. [13].

Hab. Chiapas [11 12].
N. Guatemala: Coban (*Sarg* [13]).

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The figure of *S. lurida*, left by Shuttleworth and published in the posthumous second part of his 'Notitiæ Malacologicæ,' proves very clearly that this species is inseparable from *S. bocourti*, and that too much stress must not be placed on his words "ad suturam et ad basin pallida," as this is scarcely to be seen in the coloured figure—at the base the paler colour seems only to be due to the columellar plait, which is dirty white in not very fresh specimens. Crosse and Fischer could not have seen this figure when they first described their *S. bocourti*.

In size, according to the different authors and the specimens which are before me, the Mexican examples vary between $13\frac{1}{2}$ [9] and 15 millim. [1–4], the Guatemalan ones between 14 [5] and 18, perhaps even 21 millim. [11]; the difference is, therefore, not an absolute one. The type of the var. major, 23 millim., is said to be from Chiapas [11]; I have not seen so large a specimen.

e. *Physæformes.*

16. **Streptostyla delibuta.** (Tab. V. figg. 18, 18 *a*.)

Glandina delibuta, Morelet, Test. Noviss. ii. p. 13 (1851) [1].
Achatina (*Glandina*) *delibuta*, Pfr. Monogr. Helic. Vivent. iii. p. 508 [2].
Oleacina delibuta, Gray, Cat. Pulm. p. 18 [3].
Streptostyla delibuta, Fischer & Crosse, Miss. Scient. Mex., Mollusca, i. p. 44 [4].

Hab. N. Guatemala: Vera Paz, in woody districts (*Morelet* [1–4]).

E. Guatemala: Environs of Yzabal (*Stoll*).

Var. *crassa*.

Streptostyla crassa, Strebel, Beitr. Mex. Land- und Süssw.-Conch. iii. p. 26, t. 9. figg. 2, 2 *a*, *b* [5].

Hab. N. Guatemala: Coban (*Sarg* and *Salvin* [5]); Alta Vera Paz (*Stoll*).

The suture becomes very obliquely descending and distinctly margined (accompanied by an impressed line) in the last whorl, but much less so in the preceding ones; the spire is a little concavely attenuated at about the third whorl, though on the whole rather broad and obtuse at the apex: "*delibutus*," anointed, from the greasy lustre of the surfaces. The figure here given is from a typical specimen kindly sent me by M. A. Morelet.

17. **Streptostyla ventricosula.** (Tab. V. figg. 20, 21, 21 *a*.)

Glandina ventricosula, Morelet, Test. Noviss. i. p. 15 (1849) [1].
Spiraxis (*Glandina*) *ventricosula* (Morel.), Pfr. Monogr. Helic. Vivent. iii. p. 475 [2].

Hab. Yucatan: Merida, with *S. meridana* (*Morelet* [1 2]).

Var. major. (Figg. 21, 21 *a*.)

Streptostyla binneyana, Crosse & Fischer, Journ. de Conch. xvii. p. 29 (1869) [3]; Fischer & Crosse, Miss. Scient. Mex., Mollusca, i. p. 29, t. 1. figg. 3, 3 *a* [4]; Pfr. Monogr. Helic. Vivent. ii. p. 341 [5].

Hab. Central Guatemala: Totonicapam (*Bocourt* [3–5]).
Costa Rica (*van Patten, mus. Berol.* no. 21859; and *Rogers*); San José (*P. Biolley*: var. major).

This species has been wrongly identified with *S. cylindracea*, Pfr., first by its author, Morelet himself, Journ. de Conch. iii. p. 40, but with a point of interrogation, and afterwards by all subsequent authors; it is, however, sufficiently distinct from it, as will be seen by comparing the figures of Morelet's type (fig. 20) with that of Pfeiffer's *S. cylindracea* (fig. 13).

The Costa Rican specimens (figg. 21, 21 *a*) differ in their dimensions somewhat from the typical ones—the one obtained by Rogers being longer (17 long, 8 broad, ap. $11\frac{1}{2}$ millim.), the other by van Patten shorter (21 long, $8\frac{1}{2}$ broad, ap. 12 millim.), the breadth remaining nearly the same.

18. **Streptostyla thomsoni.**

Streptostyla thomsoni, Ancey, Ann. de Malac. 1886, p. 257 [1].

Hab. Honduras: Utila Island (*Simpson* [1]).

19. **Streptostyla viridula.**

Streptostyla viridula, Angas, P. Z. S. 1879, p. 482, t. 40. fig. 12 [1].

Hab. S.E. Costa Rica: hills of Uren (*Gabb* [1]).

An imperfect specimen, which may belong to this species, found by Mr. Carmiol in Costa Rica, is in the Berlin Museum.

20. **Streptostyla plicatula.**

Streptostyla plicatula, Strebel, Beitr. Mex. Land- und Süssw.-Conch. iii. p. 16, t. 8. fig. 2 [1].

Hab. E. Mexico: Orizaba (*Botteri* [1]).

21. **Streptostyla biconica.** (Tab. V. figg. 17, 17 *a*.)

Spiraxis biconica, Pfr. P. Z. S. 1856, p. 378 [1]; Malak. Blätt. iii. p. 233 (1856) [2]; Monogr. Helic. Vivent. iv. p. 578 [3].

Streptostyla biconica (Pfr.), Fischer & Crosse, Miss. Scient. Mex., Mollusca, i. p. 32 [4].

Hab. Chiapas (*Ghiesbreght* [1–4]).

Figured from a specimen in the collection of the late Mr. Albers, who had it probably from Pfeiffer himself.

22. **Streptostyla flavescens.** (Tab. V. fig. 19, var.)

Spiraxis flavescens, Shuttl. in Bern Mittheil. 1852, p. 206 (Diagn. no. 2, p. 26) [1]; Notitiæ Malac. ii. p. 15, t. 5. fig. 7 [2]; Pfr. Monogr. Helic. Vivent. iii. p. 476 [3].

Streptostyla flavescens, Fischer & Crosse, Miss. Scient. Mex., Mollusca, i. p. 39 [4].

Hab. E. Mexico: Cordova (*Jacot-Guillarmod* [1–4]).

Var. *boucardi.* (Fig. 19.)

Spiraxis boucardi, Pfr. P. Z. S. 1861, p. 24[5]; Malak. Blätt. viii. p. 16 (1861)[6]; Monogr. Helic. Vivent. vi. p. 194[7].

Streptostyla boucardi, Fischer & Crosse, loc. cit. p. 43[8]; (?) Angas, P. Z. S. 1879, p. 482[9].

Hab. S.W. Mexico: Juquila (*Boucard* [5–8]).

S.E. Costa Rica: on the ridge between Tilorio and Zhorquin (*Gabb* [9]).

S. boucardi, according to a sketch drawn by Mr. Edgar Smith, seems to differ very little from Shuttleworth's figure of *S. flavescens*. The chief differences which can be gathered from the descriptions have been given above.

23. Streptostyla fulvida.

Streptostyla fulvida, Crosse & Fischer, Journ. de Conch. xvii. p. 32 (1869)[1]; Fischer & Crosse, Miss. Scient. Mex., Mollusca, i. p. 49, t. 1. figg. 11, 11 *a*[2]; Pfr. Monogr. Helic. Vivent. viii. p. 339[3]; Strebel, Beitr. Mex. Land- und Süssw.-Conch. iii. p. 17, t. 12. fig. 8[4].

Hab. E. Mexico, Orizaba (*Sallé* [1–3], *Botteri* [4]).

24. Streptostyla glandiformis.

Streptostyla glandiformis, Crosse & Fischer, Journ. de Conch. xvii. p. 34 (1869)[1]; Fischer & Crosse, Miss. Scient. Mex., Mollusca, i. p. 50, t. 1. figg. 10, 10 *a*[2]; Pfr. Monogr. Helic. Vivent. viii. p. 339[3].

Hab. E. Mexico, Orizaba (*Sallé* [1–3]).

25. Streptostyla physodes.

Spiraxis physodes, Shuttl. in Bern Mittheil. 1852, p. 207 (Diagn. no. 2, p. 27)[1]; Pfr. Monogr. Helic. Vivent. iii. p. 476[2], & iv. p. 579[3].

Achatina physodes (Shuttl.), Pfr. in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, *Achatina,* no. 48, p. 326, t. 26. figg. 20, 21[4].

Streptostyla physodes (Shuttl.), Fischer & Crosse, Miss. Scient. Mex., Mollusca, i. p. 54[5]; Strebel, Beitr. Mex. Land- und Süssw.-Conch. iii. pp. 6, 22, 47, t. 7. fig. 1, & t. 22. fig. 2 (living animal)[6].

Var. major.

Spiraxis auriculacea, Pfr. P. Z. S. 1856, p. 320[7]; Novit. Conch. i. t. 29. figg. 5, 6[8]; Monogr. Helic. Vivent. iv. p. 578[9].

Streptostyla auriculacea, Fischer & Crosse, loc. cit. p. 55[10].

Streptostyla physodes, Form B, Strebel, loc. cit. iii. p. 23, t. 12. fig. 12[11].

Hab. E. Mexico: Cordova (*Jacot-Guillarmod* [1 2 5], *Sallé* [7–10], *Höge*); Pacho near Jalapa, on moist ground in the woods, often on decayed wood, and Coatepec (*Doña Estefania* [6]); Mirador (*Sartorius* [11]); Vera Cruz (*coll. Cuming* [4]); Huatusco (*Dr. Hille, in coll. Dunker*).

In its glossy lustre and in general form *S. physodes* resembles the shells of the genus *Physa*, especially *P. rivalis* from the West Indies.

Pfeiffer [3] mentions a larger variety (long. 15, diam. 7 millim.), from Chiapas, which seems to be also somewhat different in colour, as he calls it "pallida;" it is unknown to me.

The columella is remarkably thick and strongly twisted in full-grown specimens, but rather thin and nearer to the perpendicular direction in younger ones.

Pfeiffer's description of *S. auriculacea* [7] agrees very well with large individuals, and deserves scarcely the name of a variety.

26. **Streptostyla limnæiformis.** (Tab. V. fig. 24, var.)

Spiraxis limneiformis, Shuttl. in Bern Mittheil. 1852, p. 207 (Diagn. no. 2, p. 26) [1]; Notitiæ Malac. ii. p. 15, t. 5. fig. 8 [2]; Pfr. Monogr. Helic. Vivent. iii. p. 476 [3].

Spiraxis limnæiformis, v. Mart. in Albers's Die Helic. ed. 2, p. 34 [4].

Streptostyla limnæiformis (Shuttl.), Fischer & Crosse, Miss. Scient. Mex., Mollusca, i. p. 38 [5].

Hab. E. Mexico: Cordova (*Jacot-Guillarmod* [1–5]).

Fischer and Crosse think it is probable that this species is based on specimens which are not full-grown.

Var. *parvula*. (Fig. 24.)

Spiraxis parvula, Pfr. P. Z. S. 1856, p. 379 [6]; Malak. Blätt. iii. p. 234 (1856) [7]; Monogr. Helic. Vivent. iv. p. 579 [8].

Streptostyla parvula (Pfr.), Fischer & Crosse, loc. cit. p. 57 [9].

Hab. Chiapas (*Ghiesbreght* [6–9]).

In Pfeiffer's collection there is a specimen from Chiapas, marked "*parvula*, var.," which is a little larger than the type (length 9, breadth 4, aperture 5 millim., instead of 8, vix 4, and $4\frac{3}{4}$) and wants the reddish band at the suture; it is marked with rather deep lines of growth and in general form and appearance much resembles *S. limnæiformis*, but is considerably smaller.

27. **Streptostyla oblonga.**

Spiraxis oblonga, Pfr. P. Z. S. 1856, p. 378 [1]; Malak. Blätt. iii. p. 233 (1856) [2]; Monogr. Helic. Vivent. iv. p. 579 [3].

Streptostyla oblonga, Fischer & Crosse, Miss. Scient. Mex., Mollusca, i. p. 57 [4].

Hab. Chiapas (*Ghiesbreght* [1–4]).

Known to me only by Pfeiffer's description.

f. *Aplectæformes.*

28. **Streptostyla sololensis.** (Tab. V. figg. 22, 23.)

Streptostyla sololensis, Crosse & Fischer, Journ. de Conch. xvii. p. 33 (1869) [1]; Fischer & Crosse, Miss. Scient. Mex., Mollusca, i. p. 53, t. 1. figg. 12, 12 *a*, & pp. 16–20, t. 4. figg. 1–5 (anatomy) [2]; Pfr. Monogr. Helic. Vivent. viii. p. 340 [3]; Strebel, Beitr. Mex. Land- und Süssw.-Conch. iii. p. 6 [4].

Bernsteingelbe *Streptostyla,* Stoll, Guatem. Reisen und Schild. aus den Jahr. 1878–83, p. 52 [5].

Hab. Central Guatemala: mountains of Solola (*Bocourt* [1–4]); ruins of Iximché or Pueblo Viejo near Tepan, 7000 feet above the sea, under heaps of stones (*Stoll* [5]) (figg. 22, 23).

According to Dr. Stoll [5], the living animal is of a bright amber colour, without spots.

29. **Streptostyla meridana.** (Tab. V. figg. 25; 26, var.)

Glandina meridana, Morelet, Test. Noviss. i. p. 15 (1849) [1].

Spiraxis (*Glandina*) *meridana,* Pfr. Monogr. Helic. Vivent. iii. p. 475 [2].

Streptostyla meridana, Fischer & Crosse, Miss. Scient. Mex., Mollusca, i. p. 32 [3].

Hab. Yucatan (*Morelet* [1–3]).

Var. *cobanensis.* Major, paullo latior. (Fig. 26.)

Spiraxis cobanensis, Tristram, P. Z. S. 1861, p. 231 [4]; Pfr. Monogr. Helic. Vivent. vi. p. 195 [5].

Streptostyla cobanensis (Tristr.), Fischer & Crosse, Miss. Scient. Mex., Mollusca, i. p. 52 [6].

Streptostyla cornea, Crosse & Fischer, Journ. de Conch. xvii. p. 33 (1869) [7]; Fischer and Crosse, Miss. Scient. Mex., Mollusca, i. p. 51, t. 1. figg. 13, 13 *a* [8]; Pfr. Monogr. Helic. Vivent. viii. p. 343 [9].

Hab. N. Guatemala: ? Coban (*Salvin* [4–6]).

S. Guatemala: San Agustin, Dep. Solola (*Bocourt* [7–9]); Hacienda Helvetia in upper Cholhuitz, Costa Cuca, 3000 feet above the sea (*Stoll*).

Near the preceding, but of smaller size, thinner, the suture not white, but of the same pale yellow colour as the rest of the shell. Owing to the kindness of M. A. Morelet, I have been enabled to compare directly his original specimens of *S. meridana* (fig. 25) with the type of *S. cobanensis,* Tristr. (fig. 26), and with the figure of Fischer and Crosse's *S. cornea*; Morelet's type is only a little smaller, comparatively more slender, and paler in colour, without any marked difference. The statement "length 18 millim." [4] is a misprint for 13 millim., as shown by the specimens themselves.

30. **Streptostyla dysoni.**

Achatina dysoni, Pfr. P. Z. S. 1846, p. 32 [1]; Monogr. Helic. Vivent. iii. p. 270 [2]; Reeve, Conch. Icon. vi., *Achatina*, t. 19. fig. 99 [3].

Spiraxis dysoni (Pfr.), Shuttl. in Bern Mittheil. 1852, p. 208 (Diagn. no. 2, p. 26) [4]; Pfr. Monogr. Helic. Vivent. iii. p. 476 [5].

Glandina dysoni (Pfr.), Morelet, Journ. de Conch. iii. p. 41 [6]; Tate, in Amer. Journ. of Conch. v. p. 158 (1870) [7].

Streptostyla dysoni, Pfr. Monogr. Helic. Vivent. viii. p. 343 [8].

Hab. Honduras: under decayed leaves (*Dyson* [1–6 8]).

Central Nicaragua: in the fosse to the Castillo Fort, also in the forest near Toro Rapids (*Tate* [7]).

Very near the preceding, but much smaller.

31. **Streptostyla vexans.**

Streptostyla vexans, Strebel, Beitr. Mex. Land- und Süssw.-Conch. iii. p. 28, t. 9. fig. 7 [1].

Hab. E. Mexico: Jalapa (*Strebel* [1]).

Resembling *S. meridana*, var. *cobanensis*, but considerably smaller.

32. **Streptostyla boyeriana.**

Streptostyla boyeriana, Crosse & Fischer, Journ. de Conch. xvii. p. 32 (1869) [1]; Fischer & Crosse, Miss. Scient. Mex., Mollusca, i. p. 46, t. 1. figg. 9, 9 *a* [2]; Pfr. Monogr. Helic. Vivent. viii. p. 342 [3].

Hab. E. Mexico: Orizaba (*Sallé* [1–3]).

More elongated than *S. biconica*.

g. *Subturritæ*.

33. **Streptostyla sargi.**

Streptostyla sargi, Crosse & Fischer, Journ. de Conch. xxiii. p. 225 (1875) [1]; Pfr. Monogr. Helic. Vivent. viii. p. 343 [2]; Strebel, Beitr. Mex. Land- und Süssw.-Conch. iii. p. 27, t. 9. fig. 4 [3].

Hab. N. Guatemala: Coban (*Sarg* [1–3]); Senahu, north side of the Polochic valley, 2800 feet (*Champion*).

The most turreted of all species of *Streptostyla*.

34. **Streptostyla mohriana.**

Spiraxis mohriana, Pfr. in Malak. Blätt. ix. p. 97 (1862) [1]; Monogr. Helic. Vivent. vi. p. 196 [2].

Streptostyla mohriana (Pfr.), Fischer & Crosse, Miss. Scient. Mex., Mollusca, i. p. 65 [3].

Hab. E. Mexico: Cerro de Borrego, near Orizaba (*Mohr* [1–3]).

C. *Ligulatæ.*

[*Petenia* *, Crosse & Fischer.]

The shell is smooth and shining, as in the preceding sections, rather elongated, and provided with a narrow dark spiral band. The foot of the animal shows at its hinder end a mucous-pore, a character which has not yet been found in any of the preceding species.

35. **Streptostyla ligulata.**

Glandina ligulata, Morelet, Test. Noviss. i. p. 12 (1849) [1]; Journ. de Conch. iii. p. 257, t. 10. fig. 3 (1852) [2]; Mörch, Journ. de Conch. xiii. p. 36 (1865) [3].

Achatina ligulata (Morel.), Pfr. in Martini & Chemnitz, Syst. Conch.-Cab., ed. 2, *Achatina*, no. 40, p. 321, t. 26. figg. 4, 5 [4].

Spiraxis (*Glandina*) *ligulata* (Morel.), Pfr. Monogr. Helic. Vivent. iii. p. 475 [5].

Petenia ligulata (Morel.), Crosse & Fischer, Journ. de Conch. xvii. p. 35 (1869) [6]; Fischer & Crosse, Miss. Scient. Mex., Mollusca, i. p. 68, t. 1. figg. 17, 17 *a* [7].

Streptostyla (*Glandina*) *ligulata* (Morel.), Pfr. Monogr. Helic. Vivent. viii. p. 344 [8].

Hab. E. Mexico: Ojo de Agua near Cordova (*Sallé* [7]).

N. Guatemala and Central Chiapas: woods of Peten and Palenque (*Morelet* [1–5 7]).

N.B.—The length of 11 millim. given by Morelet [1 2] is evidently a misprint for 16, as is shown by the indication of the natural size in his figure [2].

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36. **Streptostyla catenata.**

Spiraxis catenata, Pfr. P. Z. S. 1856, p. 378 [1]; Malak. Blätt. iii. p. 233 (1856) [2]; Monogr. Helic. Vivent. iv. p. 579 [3].

Streptostyla catenata (Pfr.), Fischer & Crosse, Miss. Scient. Mex., Mollusca, i. p. 63 [4]; Strebel, Beitr. Mex. Land- und Süssw.-Conch. iii. p. 27, t. 12. fig. 5 [5].

Hab. Chiapas (*Ghiesbreght* [1–5]).

Although it is not yet known whether this species is provided with a mucous-pore on the foot, the general resemblance to *S. ligulata* in the painting of the shell suggests that it may belong to the same subgenus.

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* Preoccupied in Pisces (Günther, 1862).

Fam. OXYGNATHA.

Jaw smooth, with a median projection at its cutting-edge. Median and lateral teeth of the radula subquadrate; marginal teeth aculeiform. Shell ordinarily thin, glossy; edges of the aperture simple.

For the purposes of this work, and to render easier the determination of the shells, I have excluded from this family all the genera without external shell (Limacidæ), or with an incomplete one, partly covered by the soft parts of the animal (Vitrinidæ); and I propose to place them near the analogous forms of the Aulacognatha.

OMPHALINA.

Omphalina, Rafinesque, Enum. and account of some remarkable Nat. Objects, p. 3 (Nov. 1831) (see Binney and Tryon, Complete Writings of Rafinesque, p. 67).
Mesomphix, Beck, Ind. Moll. p. 7 (1838).
Subfam. *Neozonitinæ,* Pfeffer in Strebel's Beitr. Mex. Land- und Süssw.-Conch. iv. p. 1 (1880).

Shell depressed, umbilicated, corneous, smooth and shining on the lower side; aperture moderately oblique; peristome simple, thin.

Foot with a double marginal furrow and a distinct mucous-pore at the hinder end. Edge of the mantle extending on the neck of the creeping animal, but not on the shell. Median tooth of the radula with a lateral cusp on each side; lateral teeth few (4–11), with the outside cusp only distinct and placed higher up; marginal teeth spiniform, numerous. Genital organs rather simple, without vesiculæ multifidæ or dart-sac.

For the anatomy, see Fischer and Crosse, Miss. Scient. Mex., Mollusca, i. pp. 143–151, t. 8; and Pfeffer, in Strebel's Beitr. Mex. Land- und Süssw.-Conch. iv. pp. 1–4, 7, 9, 12, 17, t. 8, and t. 9. figg. 1–8. Fischer and Crosse unite the *Omphalinæ*, the Palæarctic *Zonites*, and the cosmopolitan *Hyalinia* into one genus, *Zonites*; Pfeffer makes it a distinct subfamily "Neozonitinæ," and splits it into three genera, *Moreletia*, *Zonyalina*, and *Patulopsis*.

The shell is brown or yellow, unicolorous, or with one or, rarely, more dark spiral bands. The periphery is in most species rounded, even in young shells, in opposition to the Palæarctic *Zonites*, in which the young shell is always, and the adult often, angulated.

Comparative Table of the Species of *Omphalina*.

Nomen.	Figura.	Basis.	Sculptura.	Coloratio.	Diam.	Alt.	Anfr.	Patria.
euryomphala, *Pfr.*	convexa.	late umbilicata.	confertim costulato-striata, lineolis spiralibus raris, sericea.	fusco-virens, intus cœrulea.	mm. 37–43	mm. 22–25	mm. 6	N. Guatemala.
zonites, *Pfr.*	depressa, basi planulata.	angustiuscule umbilicata.	argute striata, opaca.	cornea, 1–2-fasciata.	25–32	12–14	6	S.E. & S. Mexico.
lucubrata, *Say*	subdepressa.	peranguste umbilicata.	plicato-striatula, oleoso-nitida.	rufescens, subtus flava.	21–28	13–16	4?	E. & S.W. Mexico.
——, var. fasciata, *Fisch. & Crosse.*	,,	,,	,,	fulva vel pallida, unifasciata.	25–30	15–17	5½	E. Mexico.
——, var. deppeana, *v. Mart.*	,,	anguste umbilicata.	,,	viridula.	21	12	5	E. Mexico.
——, var. olivaria, *Fisch. & Crosse.*	subglobosa.	peranguste umbilicata.	,,	,,	27	15	vix 5	S.W. Mexico.
caduca, *Pfr.*	depressa.	anguste umbilicata.	leviter striatula, lineis impressis spiralibus raris.	fulvo-cornea vel flavescens, concolor.	26–27	12–13	5½	Texas, E. Mexico.
——, var. strebeliana, *v. Mart.*	depressa, superne planata.	,,	,,	olivacea, strigis fuscis subobsoletis.	25	14	5½	E. Mexico.
paradensis, *Pfr.*	subglobosa.	,,	supra distincte arcuatim striata, lineis spiralibus levissimis vel nullis.	corneo-flavescens.	20	12	5	E. & S.W. Mexico.
bilineata, *Pfr.*	depressa.	modice umbilicata.	levissime striatula, nitida.	flavescens, unifasciata.	15–18	7–10	5–5½	E. Mexico.
——, var. trizonata, *v. Mart.*	,,	,,	,,	fasciis 3 angustis.				E. Mexico.
——, var. bizonata, *Fisch. & Crosse.*	,,	,,	,,	fasciis 2 latis.				? E. Mexico.
——, var. apicalis, *v. Mart.*	,,	,,	,,	concolor, vertice fusco.				E. Mexico.
tuxtlensis, *Cr. & Fisch.* ...	subdepresso-globosa.	,,	striis capillaceis subobliquis.	flavescens, fasciis 2 latis.	22½	12	5	S.E. Mexico.
modesta, *v. Mart.*	subdepressa.	,,	striatula.	obscure flava, concolor.	15	8	5	E. Mexico.
veracruzensis, *Pfr.*	,,	,,	striatula, nitidissima.	pallide rubella.	12½	5	5	E. Mexico.
——, var. jalapensis, *Streb.*	,,	late umbilicata.	,,	flavida vel olivacea.	9–11	5⅓–6⅓	4½–5⅜	E. Mexico, N. Guatemala.
sallæana, *v. Mart.*	depressa, angulata.	anguste umbilicata.	striatula.	flavescens.	9	4	5	E. Mexico.
sculpta, *v. Mart.*	subdepressa.	,,	argute striatula, passim impressa.	lurido-flavida.	10	5	4½	W. Mexico.
carinata, *Streb.*	subdepressa, carinata.	modice umbilicata.	supra costulato-striata.	corneo-fusca.	8–9	4–5	4	E. Mexico.

A. *Upper face of the shell sculptured, more or less opaque.* (MORELETIA, Gray.)

1. Omphalina euryomphala.

Helix euryomphala, Pfr. P. Z. S. 1845, p. 71 [1]; Monogr. Helic. Vivent. i. p. 107 [2], and iii. p. 101 [3]; and in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, *Helix*, ii. p. 396. no. 943, t. 144. figg. 1, 2 [4]; Morelet, Test. Noviss. ii. p. 27 [5], and in Journ. de Conch. ii. pp. 14–17, t. 2. figg. 6, 7 (living anim.) (1851) [6]; Reeve, Conch. Icon. vii., *Helix*, t. 97. fig. 533 [7]; Tristr. P. Z. S. 1861, p. 230, and 1863, p. 411 [8].

Zonites (*Moreletia*) *euryomphala* (Pfr.), Gray, Cat. Pulm. p. 148 (1855) [9].

Zonites (*Moreletia*) *euryomphalus*, v. Mart. in Albers's Die Helic. ed. 2, p. 67 (1860) [10]; Fischer & Crosse, Miss. Scient. Mex., Mollusca, i. p. 155, t. 7. figg. 1, 1 *a*, *b*, t. 8. figg. 1–9 (anat.) [11].

Moreletia euryomphala (Pfr.), v. Mart. P. Z. S. 1875, p. 648 [12]; Strebel, Beitr. Mex. Land- und Süssw.-Conch. iv. p. 5 [13].

Helix cymbalum, Morelet, Test. Noviss. i. p. 7 (1849) [14].

Hab. N. GUATEMALA: Mountain forests of Vera Paz [10] (*Morelet* [14], *Salvin* [8]); Mountains of Alta Vera Paz (*Bocourt* [11]); Coban [3 4 9] (*Morelet* [5 6], *Salvin* [12], *Sarg* [13], *Conradt*).

Erroneously ascribed by Pfeiffer [1 2] and Reeve [7] to Cuba. Conradt's specimens are marked as having been found at an elevation of 6000 feet.

2. Omphalina zonites.

Helix zonites, Pfr. P. Z. S. 1845, p. 127 [1]; Monogr. Helic. Vivent. i. p. 99 [2], and iv. p. 86 (vars.) [3]; Reeve, Conch. Icon. vii., *Helix*, t. 167. fig. 1122 [4] (not 109, 615).

Nanina zonites (Pfr.), Gray, Cat. Pulm. p. 140 [5].

Hyalina (*Edusa*) *zonites*, v. Mart. in Albers's Die Helic. ed. 2, p. 72 (1860) [6].

Zonites (*Moreletia*) *metonomasticus*, Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 157, t. 7. fig. 2 *a* (? 2) [7].

Moreletia metonomastica (Fisch. & Crosse), Strebel, Beitr. Mex. Land- und Süssw.-Conch. iv. p. 5 [8].

Hab. S.E. MEXICO: Tuxtla (*Boucard* [3 7 8]).

S. MEXICO: Chiapas (*Ghiesbreght* [3 7 8]).

Mr. Edgar Smith informs me that two of the three examples in Cuming's collection have a second infra-peripherical band faintly visible, and this is also to be perceived in Albers's specimen.

B. *Shell slightly sculptured above, shining, subinflated; umbilicus narrower.* (OMPHALINA, sensu str.)

3. Omphalina lucubrata. (Tab. VI. figg. 1, 1 *a*, *b*, 2, 2 *a*, 3, 4, 4 *a*, *b*, 5.)

a. typica: rufescens.

Helix lucubrata, Say, Descr. of some New Terr. & Fluv. Shells of N. Am., in New Harmony

Dissem. ii. p. 229 (1829) [1], and reprint, p. 13 (1840) [2]; Pfr. Monogr. Helic. Vivent. i. p. 98 [3]; Binney, Complete Writings of Say, p. 36 [4], and Bibliogr. N. Am. Conch. i. p. 264 [5] [not Pfr. Monogr. Helic. Vivent. iv. p. 68, v. p. 132, and vii. p. 133 (= *friabilis*, Binn.); nor Binney, Terr. air-breath. Moll. N. Am. ii. p. 225, t. 32 (= *lævigata*, Raf.)].

Hyalina lucubrata (Say), Tryon, Am. Journ. Conch. ii. p. 247, t. 18 (3). fig. 14 (1866) [6].

Hab. E. Mexico: Las Vigas, near the edge of the plateau, and Cordova (*Höge*).
S.W. Mexico: Oaxaca (*Höge*).

b. *fasciata*: pallidior, fascia peripherica distincta fusca alteraque suturali minus distincta.

Helix caduca, var. *β*, Pfr. Monogr. Helic. Vivent. iv. p. 74 [7]; P. Z. S. 1856, p. 324, t. 35. fig. 14 [8].

Zonites (*Moreletia*) *caducus*, var. *β. fasciata*, Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 163, t. 7. fig. 3 *b* [9].

Moreletia angiomphala, Strebel, Beitr. Mex. Land- und Süssw.-Conch. iv. pp. 8, 92, t. 1. figg. 2 *a–f*, 3 *a–c*, 5, 7 *b*, *d*, and 8 *a–d*; t. 8. figg. 2, 3 (anat.), 8, 8 *a* (shell); t. 9. figg. 2–4 (radula) and 16 (jaw) [10].

Hab. E. Mexico: Cajetes near San Juan Miahuatlan, between Jalapa and Misantla (*Strebel* [10]); San Antonio del Monte, near Naolingo, on the road to Misantla (*Strebel* [10]); Cuautlatitlan, between Jico and Perote (*Strebel* [10]); Ixhuacan, between Jalapa and Quimistlan (*Strebel* [10]); Coatepec, near Jalapa, in the mountains near the edge of the plateau (*Strebel* [10]); Jalapa (*F. D. Godman*); Cordova (*Höge*); Jacale, near the Volcan de Orizaba (*Sallé* [9]); Mirador (only young specimens, somewhat doubtful: *Sartorius* [10]); Vera Cruz (*Sallé* [8]).

c. *deppeana*: virescens, umbilico paullum latiore. (Figg. 4, 4 *a*, *b*.)

Hyalina (*Mesomphix*) *fuliginosa* (Griff.), v. Mart. in Malak. Blätt. xii. p. 16 (1865) [11].

Hab. E. Mexico: Orizaba (*Deppe* [11]).

d. *olivaria*: subglobosa, brunneo-viridula.

Zonites (*Moreletia*) *lucubratus*, var. *olivaria*, Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 161, t. 7. figg. 4, 4 *a* [12].

Hab. S.W. Mexico: Tepansacualco, Oaxaca (*Boucard* [12]).

I believe that I have again detected the long misunderstood species of Say in some specimens which agree very well with his words "polita" and nevertheless "anfr. corrugati," "rufescens, subtus pallidior." The very shining surface, with unequal plait-like striæ, and the distinctly paler yellowish, or even greenish, colour of the lower side are characteristic of the species before me. Spiral striæ are present, but very fine, scarcely perceptible under an ordinary lens, and very numerous. The same characters are to be found in the specimens of *O. angiomphala* given by Strebel himself to the Berlin Museum; also the fine spiral striæ, which he does not note in his otherwise very good description. The varieties *c* and *d* differ by the greenish colour; *c* (*deppeana*) shows all the mentioned peculiarities of sculpture, and forms

somewhat a transition to *d* (*olivaria*), which I can judge only from the description and figure given by Fischer and Crosse. The locality given by Say (copied by later writers) is "Mexico" [1].

4. Omphalina caduca.

Helix caduca, Pfr. in Malak. Blätt. iii. p. 158 (1846) [1]; in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, *Helix*, ii. p. 100. no. 513, t. 83. figg. 26–28 [2]; Monogr. Helic. Vivent. i. p. 89 [3], and iv. p. 74 [4]; P. Z. S. 1856, p. 324, t. 35. fig. 13 [5]; Ferd. Römer, Texas, p. 455 (1849) [6]; Reeve, Conch. Icon. vii., *Helix*, t. 97. fig. 530 [7]; Binney, Terr. air-breath. Moll. N. Am. p. 107 [8].

Hyalina (*Ammonoceras*) *caduca* (Pfr.), v. Mart. in Albers's Die Helic. ed. 2, p. 72 [9].

Hyalina caduca (Pfr.), Tryon, Am. Journ. Conch. ii. p. 248, t. 18 (3). fig. 15 [10].

Zonites caduca (Pfr.), Binney & Bland, Land and Fresh-water Shells of N. Am. i. p. 286, fig. 513 [11].

Zonites (*Moreletia*) *caducus* (Pfr.), Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 163, t. 7. figg. 3, 3 *a*, and t. 8. figg. 13–16 (radula) [12].

Zonites caducus (Pfr.), Binney, Terr. air-breath. Moll. of N. Am. v. (in Bull. Mus. Comp. Zoöl. Harv. Coll. iv.) p. 102. fig. 22 [13]; Manual of Am. Land-Shells (in Bull. U. S. Nat. Mus. no. 28), p. 352, fig. 380 [14].

Moreletia caduca (Pfr.), Strebel, Beitr. Mex. Land- und Süssw.-Conch. iv. p. 6, t. 1. figg. 1 *b* and 7 *a*, *c*, t. 8. figg. 1 (anat.) and 9, 9 *a* (shell), t. 9. figg. 1 (radula) and 17 (jaw) [15].

Hab. North America: New Washington, Texas (*Römer* [6 8 10]).

E. Mexico: Quilate near Misantla, and Soncoautla near Coatepec (*Doña Estefania* [15]); San Antonio Huatusco (*Dr. Hille, in coll. Dunker*); Jalapa, Cerro de Palmas near Cordova (*Höge*); Cordova [4], Orizaba [12] (*Sallé*); Mirador (*Strebel* [15], *Berendt* [15], *Sartorius* [15]).

Var. *strebeliana*: magis depressa, magis obscura, strigis fuscis subobsoletis.

Moreletia fuliginosa, Form B, Strebel, loc. cit. p. 6, t. 8. figg. 7, 7 *a* [16].

Hab. E. Mexico: Quilate, Hirial, and Palpoala, in the environs of Misantla (*Strebel* [16]); Cajetes near San Juan Miahuatlan, between Jalapa and Misantla, in the mountains (*Strebel* [16]).

This species comes very near the preceding, *O. lucubrata*, from which it may be distinguished by the finer and more regular striæ, the more uniform and yellowish colour, the fewer and less fine spiral striæ, and the more open umbilicus. There is no distinct peripheric band, but in one specimen I have detected a faint sutural one. I therefore transfer Pfeiffer's var. β (with Strebel's *angiomphala*) to *O. lucubrata*. *O. fuliginosa* (Griffith), Fischer and Crosse, *op. cit.* p. 164, and Strebel, *op. cit.* p. 5, has not hitherto been found within the limits of Mexico. These authors have admitted it through my having, in 1865, with much less material, determined as "*O. fuliginosa*" the specimen which I now call *O. lucubrata*, var. *deppeana*.

5. Omphalina paradensis.

Helix paradensis, Pfr. in Malak. Blätt. vii. p. 233 (1860) [1]; Monogr. Helic. Vivent. v. p. 133 [2].
Helix faradensis (errore typ.), Pfr. P. Z. S. 1861, p. 20 [3].
Zonites (*Moreletia*) *paradensis* (Pfr.), Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 158, t. 7. figg. 7, 7 *a* [4].
Moreletia paradensis (Pfr.), Strebel, Beitr. Mex. Land- und Süssw.-Conch. iv. p. 10, t. 1. fig. 6, t. 2. figg. 4, 7 [5].
Moreletia dohrnii, Strebel, loc. cit. p. 93, t. 15. fig. 1 (radula and anatomy) [6].

Hab. E. Mexico: Cajetes near San Juan Miahuatlan, Consolapa near Coatepec, and Cuautlatitlan (*Strebel* [5 6]).
S.W. Mexico: Parada, State of Oaxaca (*Sallé* [1–4]).

Pfeiffer states [1–3] that spiral lines are visible under a lens in this species, but neither in Fischer and Crosse's specimen, which comes from the same source as Pfeiffer's, nor in that contained in Pätel's collection are such striæ to be seen. Probably they are irregular and only present in some specimens, as is sometimes the case in the species of this and of the allied genera. Fischer and Crosse have established a variety, and Strebel even a new species, upon such specimens. Mr. Edgar Smith informs me that in his opinion "*O. paradensis*, notwithstanding the *very faint* spiral striation, is a rather unsatisfactory species."

6. Omphalina bilineata. (Tab. VI. fig. 6, var. *apicalis*.)

a. *subunifasciata*.

Helix bilineata, Pfr. P. Z. S. 1845, p. 128 [1]; in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, *Helix*, ii. p. 96. no. 509, t. 83. figg. 23–25 [2]; Monogr. Helic. Vivent. i. p. 91 [3], and iv. p. 78 [4]; Reeve, Conch. Icon. vii., *Helix*, t. 144. fig. 928 [5]; Berendt, in Malak. Blätt. xii. p. 208 (1865) [6].
Hyalina (*Zonyalina*) *bilineata* (Pfr.), v. Mart. in Malak. Blätt. xii. p. 16 (1865) [7].
Zonites (*Moreletia*) *bilineatus* (Pfr.), Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 167 [8].
Zonyalina bilineata (Pfr.), Strebel, Beitr. Mex. Land- und Süssw.-Conch. iv. p. 11, t. 2. figg. 3, 12 (young), 14, t. 8. fig. 4 (anat.), t. 9. figg. 5, 6 (radula), 19 (jaw) [9].
Zonites (*Zonyalina*) *bilineatus* (Pfr.), Pilsbry, Proc. Acad. Phil. 1891, p. 312 [10].

Hab. E. Mexico: Cordova (*Sallé* [4 8]); Vera Cruz (*Friedel* [7]); Mirador (*Strebel & Sartorius* [9]); Misantla (*coll. Dunker*); Jalapa (*Höge*); Pacho near Jalapa, on a creeping *Lycopodium* called "doradilla" by the natives (*Strebel* [9]); Cuautlatitlan (*Doña Estefania* [9]); Orizaba, 300 to 500 feet above the town (*Heilprin* [10]).

b. *trizonata*.

Helix zonites, Reeve, Conch. Icon. vii., *Helix*, t. 109. fig. 615 [11].
Helix bilineata, var., Pfr. Monogr. Helic. Vivent. iv. p. 78 [12].
Zonites (*Moreletia*) *bilineatus*, var. γ, Fisch. & Crosse, loc. cit. p. 168 [13].
Zonyalina venusta, Strebel, loc. cit. iv. p. 13, t. 2. figg. 13 *a*, *b*, *d* [14].

Hab. E. Mexico: Toxpam, on the slope of the Matlaquiahuitl, near Cordova, in company with the typical form (*Strebel* [14]); Jalapa and Cordova (*Höge*).

c. *bizonata.*

Zonites (*Moreletia*) *bilineatus*, var. *β. bizonata*, Fisch. & Crosse, loc. cit. p. 168, t. 7. figg. 5, 5 *a* [15].

Hab. E. Mexico: no special locality is stated [15], but probably the specimens were found by Sallé at Cordova.

d. *apicalis*: fascia nulla, apice fusca, zonula peripherica albida. (Fig. 6.)

Hab. E. Mexico: Cordova (*Höge*); Orizaba (*Heilprin* [10]).

In the typical form there is a distinct but narrow dark band in the periphery of the shell, and a fainter one just at the suture. In the var. *trizonata* this upper band is very broad, the periphery, and also the third one on the lower face of the shell, likewise broad; the surface between this lower band and the umbilicus is considerably paler than the other interspaces. In the var. *bizonata* the sutural and peripheric bands are united into a single very broad one, and the lower band also is very broad, so that very little of the yellow ground-colour remains. Compared with the varieties of bands in *Helix nemoralis* and *H. hortensis*, one might give to the typical form the formula 1–3— —, to var. *trizonata* (1, 2) 3 (4, 5), and to var. *bizonata* (1, 2) 3 (4, 5); but there is this difference, that in *H. nemoralis* and *H. hortensis* the uppermost band, 1, never reaches the suture, as it does in *Omphalina bilineata*. Strebel [9] has also seen an example of the form *a*, *subunifasciata*, in which the narrow peripheric band is divided into two very narrow ones, as is also found, but very rarely, in *Helix nemoralis*. Specimens without bands at all are mentioned by Strebel; but I have seen only one amongst about thirty from different localities.

7. **Omphalina tuxtlensis.**

Zonites tuxtlensis, Crosse & Fisch. in Journ. de Conch. xviii. p. 237 (1870) [1]; Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 166, t. 7. figg. 6, 6 *a* [2].

Hab. S.E. Mexico: Tuxtla (*Sallé* [12]).

This shell is said to be distinct from the preceding, not only by the more globose form, but by the finer and regular striæ. The coloration is the same as in *O. bilineata*, var. *bizonata*. Mr. Edgar Smith is inclined to consider it a banded specimen of *O. zonites*.

8. **Omphalina modesta,** sp. n. (Tab. VI. figg. 7, 7 *a*, *b*.)

Zonites (*Moreletia*) *bilineatus*, var. δ, lutescenti-cornea, Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 168, t. 7. fig. 5 *b* [1].

Zonyalina bilineata, Form B, Strebel, Beitr. Mex. Land- und Süssw.-Conch. iv. p. 13, t. 2. fig. 14 *a* [2].

Testa umbilicata, depressa, tenuis, nitida, levissime striatula, obscure lutea, concolor; spira convexiuscula, sutura striolata; anfr. 5, convexi, regulariter crescentes, ultimus rotundatus; umbilicus angustus; apertura lunato-rotundata; peristoma simplex, acutum (intus albo-labiatum), margine columellari brevissime reflexo.

Diam. maj. 15, min. 14, alt. 8 millim.; apert. diam. 8, lat. obliqua 7 millim.

Hab. E. Mexico: Las Vigas, on the edge of the plateau N.W. of Jalapa (*Höge*); Jalapa and probably also Nacimiento de Quilate near Misantla (*Strebel* [2]).

Nearly allied to *O. bilineata*, but distinct in shape, by more convex whorls and a larger aperture; it is also of a deeper brownish-yellow colour, and is without bands. The sculpture—very light radiating striæ, more distinct immediately at the suture, and very fine, scarcely (and not everywhere) visible spiral lineæ—is essentially the same as in *O. bilineata*.

The apex is usually somewhat worn, and a little paler than the rest of the upper surface; but it is not so distinctly whitish and opaque as is generally the case in *O. bilineata*. In one specimen, the largest of all, there is a somewhat thickened whitish inner lip within the aperture, and in some others, of rather smaller size, there are faint traces of such a lip, which seems to be repeated if the nearly full-grown animal is interrupted in its growth; but as the lip is wanting in some other specimens, it is not to be relied upon as a specific character.

Fischer's [1] figure represents a shell even somewhat more convex than the specimens which I have before me. He gives no distinct locality; but it is probable that his specimens were collected by Sallé at Cordova, with the true *O. bilineata*.

9. **Omphalina veracruzensis.** (Tab. VI. figg. 8, 8 *a*, *b*.)

a. typica.

Helix veracruzensis, Pfr. P. Z. S. 1856, p. 318 [1]; Monogr. Helic. Vivent. iv. p. 78 [2] (nec Fisch. & Crosse).

Hyalina (*Mesomphix*) *veracruzensis* (Pfr.), v. Mart. in Albers's Die Helic. ed. 2, p. 71 [3].

Testa umbilicata, depressa, tenuis, valde nitida, levissime striatula, prope suturam distinctius striatula, pallide flava vel rubello-cornea; spira convexiuscula, sutura subcrenulata; anfr. $4\frac{1}{2}$–5, planiusculi, ultimus latus, non descendens, depresse rotundatus; umbilicus latiusculus; apertura lunato-ovalis; peristoma rectum, margine columellari arcuato-declivi, vix reflexiusculo.

Hab. E. Mexico: Cordova (*Sallé* [1 2 3]).

b. *jalapensis*.

Zonyalina jalapensis, Strebel, Beitr. Mex. Land- und Süssw.-Conch. iv. p. 15, t. 2. figg. 11, 11 *a*, t. 8. fig. 5 (anat.), t. 9. figg. 7 (radula), 19 (jaw) [4].

Hab. E. Mexico: environs of Jalapa, especially in the wood of Pacho, also at Consolapa and Soncoautla near Coatepec, and at Dos Arroyos, between Jalapa and Naolingo (*Strebel* [4]); Jalapa (*Höge*, *F. D. Godman*).

N. Guatemala: Coban (*Sarg* [4]).

There is some difficulty in making out this species, Pfeiffer not having figured it; but his description is clear, and agrees very well with a shell found rather frequently at Jalapa by Strebel and Höge, except the dimensions, which are given somewhat larger by Pfeiffer. The diameter of the largest specimen found by Strebel is 11·4 millim., and many of those collected by Höge do not exceed 9, but some are 11 millim. The height given by Pfeiffer cannot be compared directly with ours, because he only measures from the apex to near the umbilicus (which is rather vague) in the heliciform shells (Monogr. Helic. Vivent. i. p. vi), and not to the base of the aperture, as is done in our descriptions; Pfeiffer's measurements of the height are, therefore, somewhat lower than ours. I here give the measurements (in millimetres) of the typical form and of the var. *jalapensis*:—

Diam. maj. $12\frac{1}{2}$, min. $10\frac{1}{2}$, alt. 5 (?); apert. diam. ?, lat. obliqua ? (*Pfr.*).

Var. *b*. „ 11 „ 10 „ $6\frac{1}{2}$ „ $5\frac{2}{3}$ „ $4\frac{2}{3}$
„ 9 „ 8 „ $5\frac{1}{3}$ „ $4\frac{1}{2}$ „ $3\frac{1}{4}$

The thinness, quasi-crenulation of the suture, and the rounded periphery of the Jalapa shells agree very well with Pfeiffer's description. The colour is somewhat variable in individuals from the same locality, but the darker ones may well be said to be "rubello-cornea." This species, moreover, is labelled as "*veracruzensis*, Pfr.," in Dunker's and Pätel's collections; and I know no other Mexican shell to which Pfeiffer's description could be reasonably applied. In Albers's collection there is a shell labelled "*H. vera-cruzensis*, Pfr., ex Cuming," and to this Strebel alludes on p. 14 [4]; it has nearly the size given by Pfeiffer (12 millim.), and also the splendour and subcrenulated suture, but it is very pale, somewhat more elevated, and its umbilicus is comparatively narrower. Nevertheless it may be an individual or local variety of this species. On its last whorl it has a peculiar impressed furrow, but this is evidently abnormal and is not mentioned by Pfeiffer. This specimen is figured here, Tab. VI. fig. 8. Fischer and Crosse's so-called *O. veracruzensis* is quite different by its distinct angulation, and I propose to separate it under the name of *O. sallæana*. In *O. veracruzensis* (Pfr.) the apex is often worn and whitish, sometimes to a greater extent than in *O. bilineata*; and in some specimens there are worn spots, which are more or less in the form of long and narrow spiral bands.

10. **Omphalina sallæana**, sp. n.

Zonites (*Moreletia*) *veracruzensis*, Fisch. & Crosse, Miss. Scient. Mex, Mollusca, i. p. 159, t. 7. figg. 8, *a*, *b* (nec Pfr.) [1].

Hab. E. Mexico: Cordova (*Sallé* [1]).

Differs from Pfeiffer's species by the distinct angulation of the last whorl, which is formally excluded by Pfeiffer's words "anfr. ult. depresse rotundatus," and is not even found in very young specimens of *O. veracruzensis*. This is the shell figured by Fischer and Crosse, and referred by them on p. 160 [1], with some doubt, to *O. veracruzensis* (Pfr.).

11. **Omphalina sculpta**, sp. n. (Tab. VI. figg. 10, 10 *a*, *b*.)

Testa subdepressa, anguste umbilicata, argute striatula et passim impressionibus linearibus brevibus oblique descendentibus notata, lurido-flavida, nitida; spira brevis, obtusa; sutura sat profunda; anfr. $4\frac{1}{2}$, convexi, sat celeriter crescentes, ultimus rotundatus, antice vix descendens; apertura perobliqua, truncato-ovata, peristomate recto, tenui, margine columellari ad insertionem triangulariter reflexo.

Diam. maj. 10, min. $8\frac{1}{2}$, alt. 5; apert. diam. $5\frac{1}{2}$, alt. obliqua 4 millim.

Hab. W. Mexico: Omilteme, in the State of Guerrero (*H. H. Smith*).

In some specimens there are one or two longer spiral linear impressions on the lower side of the last whorl.

c. *Shell keeled, costulate above, smooth beneath.* (Patulopsis, Strebel.)

12. **Omphalina carinata.**

Patulopsis carinatus, Strebel, Beitr. Mex. Land- und Süssw.-Conch. iv. p. 16, t. 4. figg. 15, 15 *a*, *b*, t. 8. fig. 6 (anat.), t. 9. figg. 8 (radula), 20 (jaw) [1].

Hab. E. Mexico: Wood of Pacho near Jalapa and environs of Coatepec (*Strebel*); Jalapa (*Höge*).

The shell of *O. carinata* looks somewhat as if it was not fully grown, on account of the small number of whorls and the comparatively large size of the first; but I do not know any Mexican species to which it can be referred.

HYALINIA.

Les Hyalines, Férussac, Tabl. Synopt. Anim. Moll., Prodr. p. 44 (1819).
Zonites, Gray, in Lond. Med. Direct. xv. p. 236 (1821) (and of many subsequent French and British authors) (nec Montfort, 1810).
Hyalinia (Agassiz), Charpentier, Nouv. Mém. Soc. Helv. i. p. 13 (1837).
Hyalina, Gray, in Turton's Man. of Land & Freshwater Shells, p. 168 (1840); Albers, in Malak. Blätt. iv. p. 91 (1857); v. Mart. in Albers's Die Helic. ed. 2, p. 67 (nec Schumacher, 1817).
Polita, Held, Isis, 1837, p. 915.
Helicella (Lamarck ?) (Risso, part.), Beck, Ind. Moll. p. 6 (1838).
Oxychilus (part.), *Discus* (part.), and *Vitrea* (one sp.), Fitzinger, Syst. Verz. Weichth. 1833, pp. 99, &c.
Vitrea (Fitzinger), E. Smith, Journ. of Conch. vi. pp. 337–339 (1891).

Shell shining, smooth, depressed, mostly umbilicated, with simple peristome. No mucous-pore at the end of the foot. Jaw smooth, with median projection. Marginal teeth aculeate.

We include in this genus the Mexican and Central-American species of moderate or small size with shining surface of the shell, which resemble the European *Hyaliniæ* so much as to suggest the probability that the internal structure may be similar.

Comparative Table of the Species of *Hyalinia*.

Nomen.	Spira.	Basis.	Sculptura.	Coloratio.	Diam.	Alt.	Anfr.	Patria.
nitidopsis, *Morel.*	convexa.	anguste umbilicata.	striatula.	succinea.	mm. 7	mm. 4	mm. 4	Central Guatemala.
glomerula, *v. Mart.*	valde convexa, subgradata.	„	levissime striatula.	albida.	5	$4\frac{1}{3}$	4	N. Guatemala.
hoffmanni, *v. Mart.*	sat convexa.	late umbilicata.	striatula.	pallide virescens.	6	$3\frac{1}{2}$	$4\frac{1}{2}$	Central Costa Rica.
tehuantepecensis, *Cr. & Fisch.*	vix prominula.	modice umbilicata.	leviter striatula.	pallide viridula, albo-radiata.	$3\frac{1}{2}$–$5\frac{1}{2}$	$1\frac{3}{4}$–3	4–$4\frac{3}{4}$	S.W. Mexico, N. Guatemala.
arborea, *Say*.....	convexa.	„	„	pallide cornea.	4–5	2–$2\frac{3}{4}$	4–$4\frac{1}{2}$	N. America, E. Mexico, N. Guatemala, Antilles.
subhyalina, *Pfr.*	plana.	„	lævigata.	albido-hyalina.	$2\frac{1}{2}$	1	$3\frac{1}{2}$	E. Mexico.
permodesta, *Streb.*	convexa.	„	minute striatula.	pallide flavescens.	2·9	1·9	$4\frac{1}{2}$	E. Mexico.
——, var. minor	„	„	„	albida.	2	$1\frac{1}{4}$	4	Costa Rica.
indentata, *Say*	planiuscula.	subperforata.	lineis incisis radiantibus, circa 40 in anfr. ult.	cornea.	5	$2\frac{1}{2}$	$4\frac{1}{2}$	N. America, S.W. Mexico.
paucilirata, *Morel.*	convexa.	modice umbilicata.	lineis incisis radiantibus, circa 30 in anfr. ult.	pallide flavescens.	6	2	$4\frac{1}{3}$	Central Guatemala.
stolli, *v. Mart.*	depressa, spira paullum immersa.	latissime umbilicata.	vix striatula.	albo-hyalina, albo-radiata.	$2\frac{1}{2}$–3	1	$3\frac{1}{3}$	W. Guatemala, Central Costa Rica.

A. *Species of the usual form and sculpture.* (HYALINIA, sensu str.)

1. **Hyalinia nitidopsis.** (Tab. VI. figg. 9, 9 *a–c.*)

Helix nitidopsis, Morelet, Test. Noviss. ii. p. 8 (1851)[1]; Pfr. Monogr. Helic. Vivent. iii. p. 68[2].
Zonites (*Hyalinia*) *nitidopsis*, Fischer & Crosse, Miss. Scient. Mex., Mollusca, i. p. 173[3].
Hab. CENTRAL GUATEMALA: Salama, very rare (*Morelet* [1–3]).

I give here a figure of this species, from a specimen lent me by A. Morelet. On microscopical examination, under a magnifying-power of $\frac{60}{1}$, a very faint, close, spiral striation is visible on the surface, no trace of which is to be seen under an ordinary lens.

2. **Hyalinia glomerula,** sp. n. (Tab. VI. figg. 14, 14 *a–d.*)

Testa anguste umbilicata, subdepresse globulosa, levissime striatula, nitida, albida, diaphana; anfr. 4, tumidi, sutura profunda discreti, ultimus supra et infra subæqualiter convexus, antice modice deflexus; apertura paullum obliqua, lunato-subcircularis, marginibus ad insertionem inter se remotis, columellari arcuato, latiusculo.

Diam. maj. 5, min. $4\frac{1}{3}$, alt. 3; apert. diam. 2, alt. obliqua 2 millim.

Hab. N. GUATEMALA: San Luis, Peten (*coll. Morelet*).

Somewhat like the preceding, but distinct by its more globular form, deeper sutures, different colour, and smaller size. Even under a magnifying-power of $\frac{60}{1}$, no trace of spiral striæ can be perceived.

3. **Hyalinia hoffmanni,** sp. n. (Tab. VI. figg. 11, 11 *a–c.*)

Testa late umbilicata, conoideo-depressa, striatula, nitidula, pallide virescens, concolor; anfr. $4\frac{1}{2}$, convexiusculi, sutura sat profunda, ultimus rotundatus, antice non deflexus, infra excavatus, sensim in umbilicum fere $\frac{1}{4}$ diametri æquantem transiens; apertura paullum obliqua, emarginato-subcircularis, marginibus remotis, columellari distincte ascendente.

Diam. maj. 6, min. $5\frac{1}{3}$, alt. $3\frac{1}{2}$; apert. diam. $2\frac{1}{2}$, alt. obliqua vix 2 millim.

Hab. COSTA RICA: Quebrada Honda, on a stem of fern (*C. Hoffmann, in mus. Berol.*); San José, among moss on the trunks of trees and below dry leaves (*H. Pittier*); Hacienda El Roble, between the Volcanos Irazu and Turrialba (*P. Biolley*).

Has the general appearance of *H. nitida*, Müll., but is distinct from it by the less swollen last whorl and the wider umbilicus. From *H. nitidopsis* it differs also by the width of the umbilicus, as Morelet says that this is narrower in his species than in *H. nitida*. No spiral striæ can be detected, even under a magnifying-power of $\frac{60}{1}$.

H. tehuantepecensis of Strebel, Beitr. Mex. Land- und Süssw.-Conch. iv. p. 18, t. 4. fig. 4, from Pacho and Mirador, E. Mexico, probably belongs to the same species; it differs very considerably from the shell so named by Crosse and Fischer.

4. **Hyalinia tehuantepecensis.**

Zonites tehuantepecensis, Crosse & Fischer, in Journ. de Conch. xviii. p. 297 (1870)[1].

Zonites (*Hyalinia*) *tehuantepecensis,* Fischer & Crosse, Miss. Scient. Mex., Mollusca, i. p. 174, t. 10. figg. 1, 1 *a*[2].

Helix tehuantepecensis (Cr. & Fisch.), Pfr. Monogr. Helic. Vivent. vii. p. 155[3].

Hab. S.W. Mexico: Tehuantepec (*Sallé*[1 3]).

b. var. major: diam. $5\frac{1}{2}$ millim.

Hab. N. Guatemala: Senahu in Alta Vera Paz (*Champion*).

The white radial stripes are not to be seen in Fischer and Crosse's figure, but they are clearly indicated in the description.

5. **Hyalinia arborea.** (Tab. VI. figg. 13, 13 *a–c.*)

Helix arborea, Say, in Nicholson's Encycl. ii., Conchology, t. 4. fig. 4 (1816[1]); Complete Writings on Conch. p. 5, t. 72. fig. 4[2]; Binney, Bost. Journ. Nat. Hist. iii. p. 422, t. 22. fig. 1[3]; Terr. air-breath. Moll. N. Am. ii. p. 235, t. 29. fig. 3[4]; A. Gould, Invert. of Massach. p. 182, fig. 110, & ed. 2, p. 110[5]; Pfr. Monogr. Helic. Vivent. i. p. 95[6], and in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, *Helix,* ii. p. 114. no. 533, t. 85. figg. 33–35[7]; Whiteaves, in Canad. Nat. 1863, p. 24[8].

Hyalina arborea (Say), Albers, Die Helic. p. 66[9]; v. Mart. in Albers's Die Helic. ed. 2, p. 69[10]; Binney & Bland, Land and Fresh-water Shells of N. Am. i. p. 33, figg. 38, 39 (jaw), 40 (radula)[11].

Zonites arboreus (Say), Binney, Manual of Am. Land-Shells (in Bull. U.S. Nat. Mus. no. 28), p. 61, fig. 13[12].

Hyalinia subhyalina, Strebel, Beitr. Mex. Land- und Süssw.-Conch. iv. p. 18, t. 4. fig. 14[13] (nec Pfr.).

Hab. North America[3–7]: from Great Slave Lake[11 12], 62° N. Lat., Labrador[11 12], and Lower Canada, where it is one of the commonest land-snails[8], to Florida[11 12], Texas[11 12], New Mexico[11 12], and California[11 12].

E. Mexico: Las Vigas (*Höge*); either Vera Cruz or Mirador near Jalapa (*Strebel*[13]).

N. Guatemala: San Luis, Peten (*coll. Morelet*).

Antilles: Cuba[6 7]; Guadeloupe[11 12].

The Mexican and Central American specimens in A. Morelet's collection are a little yellower than the majority of those from North America; but in form, size, and sculpture I cannot detect any difference. Strebel's figure and description[13] agree very well with the specimens from Las Vigas in size (4 millim.), height (2 millim.), number of whorls (4), somewhat elevated spire, sculpture, &c.; but differ considerably in all these characters from the original description and figure of Pfeiffer's *H. subhyalina,* which is "discoidea, lævigata, albido-hyalina, spira plana; anfr. $3\frac{1}{2}$, diam. maj. $2\frac{1}{2}$."

Our figure is drawn from a Mexican specimen, found at Las Vigas by Herr Höge. The shell appears, at first sight, somewhat less flattened than the figures given by

Binney, A. Gould, and Pfeiffer; but the specimen agrees very well with those from North America in the Berlin Museum and in Albers's collection.

6. **Hyalinia subhyalina.**

Helix subhyalina, Pfr. in Malak. Blätt. xiv. p. 196 (1867) [1]; Monogr. Helic. Vivent. v. p. 476 [2].

Zonites (*Hyalinia*) *subhyalinus* (Pfr.), Fischer & Crosse, Miss. Scient. Mex., Mollusca, i. p. 172 [3]; Pilsbry, Proc. Acad. Phil. 1891, p. 312 [4].

Hab. E. Mexico: Vera Cruz (*Berendt* [1–3]); Orizaba, on hills (*Heilprin* [4]).

Strebel suggests that this may be the young state of the preceding.

7. **Hyalinia permodesta.**

Hyalinia permodesta, Strebel, Beitr. Mex. Land- und Süssw.-Conch. iv. p. 19, t. 4. fig. 9 [1]. 1880

Hab. E. Mexico: Plantation Mirador, near Jalapa (*Strebel* [1]).

Distinct from *H. arborea* by its narrower umbilicus, higher spire, narrower whorls, and smaller size.

Var. minor (2 millim. diam.).

Hab. Costa Rica: San Francisco de los Rios, 1100 metres above the sea (*H. Pittier*).

B. *Upperside of the shell marked with sharply defined radial impressions.*

(Glyphyalinia, subg. nov.)

8. **Hyalinia indentata.**

Helix indentata, Say, in Journ. Acad. Phil. ii. p. 372 (1822) [1]; Binney, in Bost. Journ. Nat. Hist. iii. p. 415, t. 22. fig. 3 [2]; A. Gould, Invert. of Massach. p. 181, fig. 109 [3]; Pfr. Monogr. Helic. Vivent. i. p. 59 [4], and in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, *Helix*, i. p. 221. no. 190, t. 34. figg. 12–15 [5]; Binney, Terr. air-breath. Moll. N. Am. ii. p. 242, t. 29. fig. 2, & iv. p. 119 [6].

Hyalina indentata (Say), Binney & Bland, Land & Fresh-water Shells of N. Am. p. 35, fig. 44 (also figg. 46, 47, jaw and radula) [7].

Zonites indentatus (Say), Binney, Manual of Am. Land-Shells (in Bull. U. S. Nat. Mus. no. 28), p. 62 [8]; Suppl. i. p. 139, t. 4. figg. H, I [9].

Zonites (*Hyalinia*) *indentatus*, Pilsbry, in Proc. Acad. Phil. 1891, p. 312 [10].

Hab. North America: from Canada to Texas, and from Dacotah to Florida [7 8].

S.W. Mexico: Yautepec, Morelos, Southward from the city of Mexico and also the plateau on the upper confluents of the Rio de las Balsas (*Heilprin* [10]).

Probably also in Northern Mexico. The Latin name "indentata" is to be understood in the signification of the English "indented." According to Pilsbry [10], this is the most abundant of the smaller *Zonites* in Texas.

9. **Hyalinia paucilirata.** (Tab. VI. figg. 12, 12 *a–c.*)

Helix paucilirata, Morelet, Test. Noviss. ii. p. 8 (1851) [1]; Pfr. Monogr. Helic. Vivent. iii. p. 94 [2].
Zonites (*Hyalinia*) *pauciliratus*, Fischer & Crosse, Miss. Scient. Mex., Mollusca, i. p. 173 [3].

Hab. Central Guatemala: Salama, not frequent (*Morelet* [1–3]).

The chief peculiarity of *H. paucilirata* is the "lineolis remotis irradiantibus utrinque lirata." These are, according to the original specimen kindly lent me by the author, impressed radiating lines or indentations, as if cut into the surface of the shell—such as are to be found also in the North-American *H. indentata*, Say, and in *H. insecta*, v. Mart., from Puerto Rico, but somewhat numerous; in the last whorl about thirty are present, ten of which are within the last 2 millim. of the aperture, the rest somewhat more apart one from the other.

Three species only of this subdivision are known to me, all from North or Central America.

c. *Whorls rapidly increasing in size, the last proportionately very large, not descending at the aperture; spire flat or immersed.* (Ammonoceras, Pfr.)

10. **Hyalinia stolli,** sp. n. (Tab. VI. figg. 15, 15 *a–c.*)

Testa latissime umbilicata, depressa, nitida, vix striatula, albido-hyalina, strigis radiantibus albis compluribus; anfr. $3\frac{1}{2}$, celeriter crescentes, spira paullum immersa, sutura profunda, ultimus rotundatus; apertura sat obliqua, dilatata, margine supero valde arcuato.

(*a*) Diam. maj. $2\frac{1}{2}$, min. 2 , alt. 1; apert. diam. 1 , alt. obliqua 1 millim.
(*b*) „ 3 „ $2\frac{1}{3}$ „ „ $1\frac{1}{3}$ „ 1 millim.

Hab. W. Guatemala: Retalhuleu (*O. Stoll*).—Dimensions *a*.

Costa Rica: San José, at 1135 metres above the sea, among moss (*P. Biolley*).—Dimensions *b*.

No spiral striæ are to be seen, even under a magnifying-power of $\frac{60}{1}$.

The representatives of this subdivision are confined to Central and South America; some species of much larger size are found in Colombia (*H. flora*, Pfr.) and Brazil (*H. euspira*, Pfr.).

GUPPYA.

Stenopus, Lansdown Guilding, Zool. Journ. iii. p. 527 (1828) (nec Latreille, 1825, Crustacea).
Guppya, Mörch, in Journ. de Conch. xv. p. 256 (1867); Tate, in Amer. Journ. of Conch. v. p. 154 (1870).
Habroconus, Fischer & Crosse, Miss. Scient. Mex., Mollusca, i. pp. 154, 171 (1878); Strebel, Beitr. Mex. Land- und Süssw.-Conch. iv. p. 23 (1880).

Shells of small size, shining surface, and trochoid shape, with simple aperture and very small or no perforation. Foot with a distinct mucous-pore at the hinder end and a longitudinally tripartite sole. Marginal teeth of the radula bicuspid.

COMPARATIVE TABLE OF THE SPECIES OF *GUPPYA*.

Nomen.	Figura.	Basis.	Sculptura.	Coloratio.	Diam.	Alt.	Anfr.	Patria.
championi, *v. Mart.*	conoideo-globosa, rotundata.	valde convexa, imperforata.	levissime striatula, striis spiralibus nullis.	flava.	mm. 7	mm. 5	mm. 5½	N. & W. Guatemala, Centr. Costa Rica.
trochulina, *Morel.*	globoso-trochiformis, angulata.	valde convexa, anguste perforata.	leviter striatula.	pallide cornea vel corneo-fulva.	5	4½	6, plani.	E. Mexico, N. Guatemala, Centr. Costa Rica.
angasi, *v. Mart.*...	obeso-trochiformis, filo-carinata.	convexa, anguste perforata.	striatula.	fusco-cinerea.	5	3½	6½	Costa Rica.
elegans, *Streb.* ...	elate trochiformis, non angulata.	modice convexa, imperforata.	striatula.	pallide cornea.	4⅓	4	7	E. & Centr. Mexico, Centr. Guatemala.
pittieri, *v. Mart.* .	trochoides, subangulata.	modice convexa, subperforata.	levissime striatula, microscopice spiratim striolata.	corneo-fulva.	3½	2½–2¾	5½, convexi.	Centr. Costa Rica.
biolleyi, *v. Mart.* .	conoideo-globosa, subangulata.	sat convexa, anguste perforata.	leviter striatula.	fulva.	2½	2	5	W. Guatemala, Centr. Costa Rica.
micans, *Angas* ...	depresso-globosa, (subangulata ?).	valde convexa, anguste perforata.	striatula.	fulva?	6	4	5	Costa Rica.
utillensis, *Ancey* .	"conica."	convexa, perforata.	lævis ?	pallide cornea.	2½	2¼	vix 5	Honduras.
gundlachi, *Pfr.*...	depresse turbinata, rotundata.	excavata, subperforata.	subtiliter spiratim striata.	fulva.	2½	1⅔	5	N. Amer., Yucatan Centr. Nicaragua, Antilles.
orosciana, *v. Mart.*	depresse trochoides, angulata.	parum convexa, anguste perforata.	„	læte fulva.	2¾	1¾	5, plani.	? N. Guatemala, Costa Rica.
spirulata, *Pfr.* ...	lenticularis, carinata.	medio impressa, imperforata.	distincte spiratim striata.	fulva.	9	4½	5	W. Nicaragua.

A. *Testa lævis vel indistincte spiratim striatula.* (GUPPYA, s. str.)

1. **Guppya championi,** sp. n. (Tab. VI. figg. 16, 16 *a–c.*)

Testa imperforata, conoideo-globosa, tenuissima, nitida, levissime striatula, striis spiralibus nullis, pallide flava; anfractus 5½, convexiusculi, ultimus ad peripheriam rotundatus, basi valde convexus; apertura lunato-rotundata, peristomate simplice, margine basali horizontali, stricto, tenui.

Diam. maj. 7, alt. 5 millim.

Hab. N. GUATEMALA: Purula, towards the head of the Polochic valley (*Champion*).

W. GUATEMALA: district of Cholhuitz in the Costa Cuca, Pacific slope (*Stoll*).

CENTRAL COSTA RICA: Hacienda El Roble, between the Volcanos Irazu and Turrialba, and environs of San José (*Biolley*).

Distinct from the following species by the larger size and the rounded periphery of the last whorl. No spiral striæ visible, even under a magnifying-power of $\frac{60}{1}$.

2. **Guppya trochulina.** (Tab. VI. figg. 17, 17 *a–d*.)

Helix trochulina, Morelet, Test. Noviss. ii. p. 10 (1851)[1]; Pfr. Monogr. Helic. Viv. iii. p. 40[2].
Zonites (*Habroconus*) *trochulinus* (Morel.), Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 172[3].
Habroconus trochulinus (Morel.), Strebel, Beitr. Mex. Land- und Süssw.-Conch. iv. p. 24[4].
Zonites selenkai, Pfr. in Malak. Blätt. xii. p. 77 (1866)[5]; Monogr. Helic. Vivent. v. p. 58[6]; Semper, Reisen im Archipel der Philipp., Landmoll. i. p. 80, t. 5. fig. 25 (radula)[7].
Zonites (*Habroconus*) *selenkei* (Pfr.), Fisch. & Crosse, loc. cit. p. 171, t. 7. figg. 9, 9 *a*, *b*[8].
Habroconus selenkai (Pfr.), Strebel, loc. cit. p. 23, t. 4. figg. 1, 1 *a* (shell), t. 9. fig. 9 (radula)[9].

Hab. E. Mexico: Agua Caliente near Misantla, and plantation Mirador near Jalapa, in ravines (barrancas), on shrubs (*Berendt & Strebel* 5–9); Jalapa (*Höge*).
N. Guatemala: woods of Peten, near San Luis (*Morelet* 1–4).
Central Costa Rica: environs of San José, near the streamlet Atajueleta, 1135 metres above the sea, among moss (*Biolley*).

Morelet's species has not been recognized by Pfeiffer and later authors, because in his description[1] it is termed "imperforata." But an examination of the only specimen which still exists in his collection has satisfied me that there is a very minute perforation at the centre of its base, visible only by close inspection under favourable light; and as I can find no other tenable difference, I feel bound to treat *G. trochulina* and *G. selenkai* as belonging to one and the same species.

Under a magnifying-power of $\frac{60}{1}$ irregular spiral striæ are to be seen on the surface of the shell, not close together, but with large intervals.

The figure here given is drawn from Morelet's specimen.

3. **Guppya angasi.**

Stenopus guildingi, Angas, P. Z. S. 1879, p. 484, t. 40. fig. 14 (nec Bland)[1].

Hab. Costa Rica (*Gabb*[1]).

Appears to be distinct from all others of the genus by the "strongly defined thread-like" carina. The specific name given by Angas cannot stand, as there is already a *Stenopus* (or *Guppya*) *guildingi*, from Venezuela, named by Th. Bland in 1865.

4. **Guppya elegans.**

Habroconus elegans, Strebel, Beitr. Mex. Land- und Süssw.-Conch. iv. p. 24, t. 4. figg. 1 *b*, 1 *c*[1].
Stenopus elegans, Pilsbry, Proc. Acad. Phil. 1891, p. 312[2].

Hab. E. Mexico: wood of Pacho, near Jalapa (*Doña Estefania*[1]); Orizaba, about 500 feet above the town (*Heilprin*[2]).
Central Mexico: Yautepec, Morelos (*Heilprin*[2]).
Central Guatemala: Salama (*coll. Morelet*).

5. **Guppya pittieri,** sp. n. (Tab. VI. figg. 18, 18 *a–d.*)

Testa anguste perforata, rotundato-conica, angustispira, tenuis, nitida, levissime striatula, corneo-fulva; anfractus $5\frac{1}{2}$, convexiusculi, ultimus ad peripheriam obtuse angulatus, basi modice convexus; apertura lunato-rotundata, peristomate simplice.

Diam. maj. 3, alt. $2\frac{1}{2}$ millim.

Hab. Central Costa Rica: San Francisco de los Rios, near San José, 1100 metres above the sea, in the hedges surrounding the coffee-plantations (*Pittier*); La Urraca, near San José, at 1135 metres above the sea, in moss (*Biolley*).

This species bears about the same relationship to *G. biolleyi* as *G. elegans* does to *G. trochulina* (*selenkai*), differing chiefly by the narrower and more gradually increasing whorls, the last of which occupies a smaller part of the whole height. Under the microscope, with a magnifying-power of $\frac{60}{1}$, very faint and very close spiral striæ are to be detected under favourable light, chiefly at the base of the shell.

Named in honour of H. Pittier, of the National Physico-geographical Institute of San José de Costa Rica, who has sent me valuable shells collected by himself during his explorations in that country in 1891.

6. **Guppya biolleyi,** sp. n. (Tab. VI. figg. 19, 19 *a–d.*)

Testa anguste perforata, conoideo-globosa, tenuis, nitida, leviter striatula; anfractus 5, convexiusculi, ultimus ad peripheriam obtuse angulatus, basi convexus; apertura lunato-rotundata, peristomate simplice, margine basali arcuato.

Diam. maj. $2\frac{1}{2}$, min. $2\frac{1}{4}$, alt. 2 millim.

Hab. W. Guatemala: Hacienda Helvetia, in the Costa Cuca, Pacific slope (*Stoll*).

Central Costa Rica: La Urraca, near San José, 1100 to 1135 metres above the sea, on trunks and among moss (*Biolley*); San Francisco de los Rios (*H. Pittier*).

This species comes near the preceding (*G. pittieri*), but is more globose, somewhat like *G. gundlachi.* By examination under a magnifying-power of $\frac{60}{1}$ only very faint, scattered, indistinct spiral striæ are visible on the surface of the shell, the striæ being somewhat more distinct on the underside.

Named in honour of P. Biolley, who has sent several interesting land and freshwater shells from Costa Rica to the Museum in Neuchâtel, Switzerland.

7. **Guppya micans.**

Stenopus micans, Angas, P. Z. S. 1879, p. 485, t. 40. fig. 15 [1].

Hab. Costa Rica (*Gabb* [1]).

The figure given by Angas does not correspond with the description: in the figure the periphery of the shell is quite rounded, and there is a dark line which is intended perhaps to mark a subangulation, somewhat above the periphery of the last whorl, but no trace of it is to be seen near the aperture; in the description the periphery is said

to be bluntly angulated. To judge from the description only, one might suppose it to belong to the same species as the preceding, but the figure shows a much more depressed and rounded shell. The aperture in the figure, however, looks as if it had been drawn from a broken specimen.

8. **Guppya utillensis.**

Conulus utillensis, Ancey, Ann. de Malac. ii. p. 238 (1886)[1].

Hab. Honduras: Utilla Island (*Simpson*[1]).

I have not seen a specimen of this species.

B. *Testa lineis incisis spiralibus regularibus sculptæ.* (Spiroconulus, subg. nov.)

9. **Guppya gundlachi.**

Helix pusilla, Pfr. in Wiegm. Archiv für Naturg. 1839, 1, p. 351[1] (not *H. pusilla*, Lowe, 1833, from Madeira).

Helix gundlachi, Pfr. loc. cit. 1840, 1, p. 250[2]; in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, *Helix*, i. p. 239. no. 213, t. 30. figg. 25–28[3]; Monogr. Helic. Vivent. i. p. 50[4], and iv. p. 25[5]; Reeve, Conch. Icon. vii., *Helix*, t. 67. fig. 345[6]; Shuttl. in Bern Mittheil. 1854 (Diagn. no. 6), p. 130[7]; Gloyne, Journ. de Conch. xx. p. 28 (1872)[8].

Zonites (*Conulus*) *gundlachi* (Pfr.), H. & A. Adams, Gen. Moll. ii. p. 116[9].

Zonites gundlachi (Pfr.), Binney, Terr. air-breath. Moll. N. Am. v. p. 127, t. 2. fig. D (radula)[10]; Suppl. iii. (in Bull. Mus. Comp. Zoöl. Harv. Coll. xix. 1890) p. 195[11]; Manual of Am. Land-Shells (in Bull. U. S. Nat. Mus. no. 28), p. 353, fig. 382[12].

Hyalina (*Conulus*) *gundlachi* (Pfr.), v. Mart. in Albers's Die Helic. ed. 2, p. 73[13]; Binney & Bland, Land & Fresh-water Shells of N. Am. i. p. 48, fig. 77[14].

Conulus gundlachi (Pfr.), Tryon, Am. Journ. Conch. ii. p. 256, t. 19 (4). fig. 64[15].

Guppya gundlachi (Pfr.), Tate, Am. Journ. Conch. v. p. 155[16]; v. Mart. in Jahrb. d. Malak. Gesellsch. iv. p. 346 (1877)[17].

Conulus (*Discoconulus*) *gundlachi* (Pfr.), O. Reinhardt, in Sitzungsber. d. Gesellsch. naturf. Freunde zu Berl. 1883, p. 85[18].

Helix fulvoidea, Morelet, Test. Noviss. ii. p. 9 (1851)[19]; Monogr. Helic. Vivent. iii. p. 66[20].

Zonites (*Hyalinia*) *fulvoideus* (Morel.), Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 177[21].

Helix egena, A. Gould, in Binney's Terr. air-breath. Moll. N. Am. ii. p. 245, t. 22 *a*. fig. 3[22] (nec Say).

Hab. North America: Florida [10 15 22], on the southern extremity of the peninsula, and also on the west coast as far north as Cedar Keys[12]; Texas[11].

Yucatan: Carmen island, at the entrance of the Laguna de Terminos (*Morelet* [19 20 21]).

Central Nicaragua: Chontales and forest by the River San Juan, Toro Rapids, amongst moss on trees (*Tate*[16]).

Antilles: Cuba [1–4 6 12–16], Jamaica [8], Porto Rico [7 12 13 14 17], Vieque [7 12 14 17], St. Thomas [5 7 12–14], Guadeloupe [10 12].

G. gundlachi appears to be widely distributed in the Antilles and on the continent of Central America, and has, perhaps, been introduced with vegetables into some of these places.

The systematic position of this species is somewhat doubtful, as it bears a considerable resemblance to the European *Conulus fulvus*; the radula, however, figured by Binney, agrees very well with that of *Guppya trochulina* (*selenkai*), figured by Strebel (see *anteà*, p. 120), and the mucous-pore has been observed by R. Tate [16].

The spiral striæ in *G. gundlachi* are only visible under a strong lens; they are very regular, deeply cut, and rather numerous, but not very close together. Similar striæ are also present in Mr. A. Morelet's specimens of *G. fulvoidea*, from Carmen Island. This circumstance gives some additional weight to Tryon's [15] identification of a Nicaraguan shell with Pfeiffer's *G. gundlachi*.

10. **Guppya orosciana,** sp. n. (Tab. VI. figg. 20, 20 *a–d.*)

Testa anguste perforata, depresse trochoides, tenuis, nitida, sub lente spiratim striata, læte fulva; anfr. 5, planiusculi, sat celeriter crescentes, ultimus ad peripheriam distincte angulatus, basi leviter convexus; apertura lunata, peristomate simplice, margine basali leviter arcuato.

Diam. maj. $2\frac{3}{4}$, min. $2\frac{1}{2}$, alt. $1\frac{3}{4}$ millim.

Hab. ? N. Guatemala: Coban (*coll. Morelet*).

Costa Rica: Calera de San Ramon (*S. Orosco*).

Distinct from the preceding (*G. gundlachi*) by the whorls being really angulated. The spiral striæ are nearly as in that species. The specimen from Coban, in Morelet's collection, is somewhat smaller, $2\frac{1}{3}$ millim. in diameter, and of a paler yellow colour; but in other respects it agrees with the Costa Rican type, from which our figure is taken. Named in honour of Señor Secundino Orosco, who assisted Prof. H. Pittier in his exploration of Costa Rica.

Several species of a somewhat similar form and size, but distinct by the opaque (not shining) surface of the shell, will be found below (p. 131) under *Helix*, subg. *Acanthinula*.

11. **Guppya (?) spirulata.**

Helix spirulata, Pfr. P.Z.S. 1845, p. 129 [1]; Monogr. Helic. Vivent. i. p. 37 [2]; in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, *Helix*, i. p. 244. no. 220, t. 30. figg. 11–14 [3]; Reeve, Conch. Icon. vii., *Helix*, t. 110. fig. 617 [4].

Zonites (*Trochomorpha*) *spirulata*, H. & A. Adams, Gen. Moll. ii. p. 115 [5].

Helix (*Pelia*) *spirulata* (Pfr.), v. Mart. in Albers's Die Helic. ed. 2, p. 91 [6].

Hab. W. Nicaragua: Realejo, on trunks of trees (*Cuming* [1–4 6]).

Although this species differs by the remarkably larger size and the less glossy appearance of the shell from all the preceding, yet the spiral sculpture and the general outline of the shell seem to bring it near *G. gundlachi*. I therefore place it here pro-

visionally, until the knowledge of the living animal and its radula may confirm or refute this view. Albers proposed for it the subgenus *Pelia* (of *Helix*), which he placed between *Patula* and *Gonostoma*; but this name was already twice preoccupied in zoology, among the Crustacea in 1835, and in the Lepidoptera in 1849.

PSEUDOHYALINA.

Pseudohyalina, Morse, Journ. Portland Soc. i. p. 16 (1864).
Chanomphalus, Strebel (et Pfeffer), Beitr. Mex. Land- und Süssw.-Conch. iv. p. 19 (1880).
Pycnogyra, Strebel, loc. cit. p. 20.

Shell somewhat glossy, but with minute sculpture, rather whitish, diaphanous; aperture simple; umbilicus wide. Jaw minutely perpendicularly striated, with a small median projection. Radula with spiniform lateral teeth, amounting to about a third of the whole number.

This genus connects somewhat the family Oxygnatha with the Aulacognatha, on account of the sculpture (minute, however) of the shell and jaw. P. Fischer [Manuel de Conch. fasc. v. p. 470 (1882)] has treated it as only a section of *Patula*; but the form of the marginal teeth, I think, places it distinctly near *Hyalinia*.

Nomen.	Forma.	Basis.	Sculptura.	Coloratio.	Diam.	Alt.	Anfr.	Patria.
minuscula, *Binn.*	subdiscoidea, spira leviter convexa, rotundata.	perspective umbilicata.	minute striatula.	corneo-albida.	mm. 2½	mm. 1½	4	N. Am., E. & S.E. Mexico, Yucatan, E. Guatemala, Centr. Nicaragua, Antilles, &c.
elegantula, *Pfr.*...	discoidea, spira plana, rotundata.	late umbilicata.	distincte costulata usque in umbilicum.	albida.	1·3	½	3½	E. Mexico, W. Guatemala, Centr. Costa Rica.
cidariscus, *v. Mart.*	subdepressa, spira gradata, rotundata.	,,	,,	,,	2½	2	4	S.E. Mexico.
berendti, *Pfr.* ...	depressa, spira prominula, angulata.	perspective umbilicata.	minute costulata.	corneo-flava.	4	2½	6½	E. Mexico.

A. *Whorls* 4, *rounded.* (PSEUDOHYALINA, sensu str.)

1. Pseudohyalina minuscula.

Helix minuscula, Binney, Bost. Journ. Nat. Hist. iii. p. 435, t. 22. fig. 4 (1840) [1]; Pfr. Symb. Hist. Helic. ii. p. 33 [2]; Monogr. Helic. Vivent. i. p. 114 [3]; in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, *Helix*, ii. p. 112. no. 530, t. 85. figg. 20–23 [4]; Shuttl. in Bern Mittheil. 1852 (Diagn. no. 6), p. 129 [5]; Reeve, Conch. Icon. vii., *Helix*, t. 67. fig. 349 [6]; Binney, Terr. air-breath. Moll. N. Am. iii. t. 17. fig. 2 [7]; Morse, Am. Nat. i. p. 543, fig. 35 (1867) [8];

Newcomb, Am. Journ. Conch. ii. p. 13 (1866) [9]; Arango y Moliña, Contrib. faun. malac. Cabana, p. 67 (1878) [10].

Helicella minuscula (Binn.), H. & A. Adams, Gen. Moll. ii. p. 188 [11].

Helix (*Microphysa*) *minuscula* (Binn.), v. Mart. in Albers's Die Helic. ed. 2, p. 82 [12].

Pseudohyalina minuscula (Binn.), Morse, Journ. Portland Soc. i. p. 16, fig. 34, and t. 7. fig. 35 (jaw, radula) [13]; Tryon, Am. Journ. Conch. ii. p. 264, t. 19 (4). fig. 62 [14].

Hyalina minuscula, Binney & Bland, Land & Fresh-water Shells N. Am. i. p. 37, figg. 50–52 [15].

Hyalina (*Pseudohyalina*) *minuscula* (Binn.), O. Reinhardt, in Sitzungsber. d. Gesellsch. nat. Freunde zu Berl. 1876, p. 92 [16]; A. Adams, Ann. & Mag. Nat. Hist. (4) i. p. 467 [17].

Zonites (*Hyalinia*) *minusculus* (Binn.), Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 175 [18].

Zonites minusculus, Binney, Terr. air-breath. Moll. N. Am. v. (Bull. Mus. Comp. Zoöl. Harv. Col. iv.) p. 118, t. 3. fig. H (radula) [19]; Manual of Am. Land-Shells (in Bull. U. S. Nat. Mus. no. 28), p. 63, fig. 19 [20].

Chanomphalus minusculus (Binn.), Strebel, Beitr. Mex. Land- und Süssw.-Conch. iv. p. 19, t. 4. fig. 10 [21].

Helix minutalis, Morelet, Test. Noviss. ii. p. 7 (1851) [22].

Helix apex, C. B. Adams, Contrib. to Conch. i. p. 36 [23]; Reeve, Conch. Icon. vii., *Helix*, t. 66. fig. 339 [24].

Helix lavalleana, d'Orbigny, in Ramon de la Sagra's Hist. fis., polit. y nat. de Cuba, Moll. p. 84, t. 8. figg. 16–19 [25]; French edit. p. 161, t. 8. figg. 20–23 [26].

Helix blakeana, Tate, Am. Journ. Conch. v. p. 155, t. 16. fig. 3 (1870) [27].

Hab. North America: from Maine [14], and Vermont [1–4 12], Ohio [1 8], and Red River [15 19 20] to Florida [12 15 19 20], Arkansas [19 20], and Texas [15 19 20]; San Bernardino valley, California [9]; Arizona [19 20].

E. Mexico: wood of Pacho near Jalapa (*E. Salas* [21]); Hacienda de Mirador near Jalapa (*Sartorius, Berendt, and Strebel* [21]).

S.E. Mexico; Palenque (*coll. Morelet*).

Yucatan: Carmen Island (*coll. Morelet*); Palizada (*Morelet* [18 22]).

E. Guatemala: Yzabal (*coll. Morelet*).

Central Nicaragua: Chontales forest (*Tate* [27]).

Bermuda [15].

Antilles: Cuba [4 10 15 22 25 26]; Jamaica [4 15 23]; Porto Rico [5 12 15]; St. Thomas [10].

Asiatic Russia: Vladimir Bay, Mantchuria [17].

Japan: Yedo [16].

One of the very widely distributed small land-shells. I cannot detect any trustworthy difference between *P. blakeana* and *P. minuscula*.

2. Pseudohyalina elegantula.

Helix elegantula, Pfr. in Malak. Blätt. xiv. p. 196 (1867) [1]; Monogr. Helic. Vivent. v. p. 474 [2].

Zonites (*Hyalinia*) *elegantulus* (Pfr.), Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 177 [3].

Chanomphalus elegantulus (Pfr.), Strebel, Beitr. Mex. Land- und Süssw.-Conch. iv. p. 20, t. 4 fig. 11 [4].

Hab. E. Mexico: environs of Vera Cruz (*Berendt and Strebel* [1–4]).

W. Guatemala: district of Cholhuitz, in the Costa Cuca, Pacific slope, on the ground, in the woods (*Stoll*).

Central Costa Rica: Tierra Blanca, on the southern slope of the Volcan de Irazu (*Biolley*).

3. **Pseudohyalina cidariscus,** sp. n. (Tab. VII. figg. 1, 1 *a–d.*)

Testa perspective umbilicata, subdepressa, costulis sat confertis, paullum obliquis sculpta, albida; spira prominula, subgradata; anfr. 4, valde convexi, ultimus rotundatus, basi convexus; apertura lunato-rotundata, peristomate simplice, margine basali valde arcuato.

Diam. maj. $2\frac{1}{2}$, alt. 2, apert. 1 millim.

Hab. S.E. Mexico: Palenque, in the forest (*coll. Morelet*).

Near the preceding (*P. elegantula*), but with the upper whorls very distinctly elevated above the last one, the sculpture rather more strong.

B. *Whorls* $6\frac{1}{2}$, *subangulated, rising one above the other.* (Pycnogyra, Strebel.)

4. **Pseudohyalina berendti.**

Helix berendti, Pfr. in Malak. Blätt. viii. p. 72, t. 1. figg. 9–12 (1861) [1]; Monogr. Helic. Vivent. v. p. 155 [2].

Helix (*Microphysa*) *berendti,* Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 226, t. 10. figg. 6, 6 *a, b* [3].

Pycnogyra berendti (Pfr.), Strebel, Beitr. Mex. Land- und Süssw.-Conch. iv. p. 20, t. 4. fig. 5 (shell), t. 9. fig. 12 (radula) [4].

Hab. E. Mexico: environs of Jalapa; Hacienda de Mirador (*Sartorius, Berendt, and Strebel* [1–4]); Coatepec, Consolapa, and Dos Arroyos (*E. Salas* [4]).

Fam. AULACOGNATHA.

Jaw more or less distinctly ribbed, its cutting-edge crenulated. All the teeth of the radula rather subquadrate; no spiniform marginals. Shell generally more solid, sculptured and coloured, of very various form.

PATULA.

Patula, Held, Isis, 1837, p. 915.

Euryomphala, Beck, Ind. Moll. p. 8 (1838).

The normal forms of this genus are characterized by a sculptured, opaque (not glossy) shell, a wide umbilicus, and a thin-edged aperture. The jaw has many, not very prominent, ribs; the teeth of the radula are all subquadrate; no spiniform laterals. No dart-sac; no vesiculæ multifidæ; no flagellum.

Geographical distribution nearly cosmopolitan, but chiefly in temperate climates.

The anatomy of very few of the Mexican and Central-American species is known as yet; the others are only placed here by the general analogy of the shell. Some are very aberrant in a single character, *e. g.* by a very narrow umbilicus; but I refrain for the present from treating these aberrant forms as generically distinct, and place them as subdivisions of the cosmopolitan genus *Patula*, until better information is obtained.

Comparative Table of the Species of *Patula*.

Nomen.	Forma.	Umbilicus.	Sculptura.	Coloratio.	Diam.	Alt.	Anfr.	Patria.
mazatlanica, *Pfr.*	depressa, spira parum convexa, rotundata.	latus, $\frac{1}{3}$ diametri.	conferte costulato-striata.	fusco-grisea.	mm. $3\frac{1}{3}$	mm. 1	4	? California, N.W. Mexico.
hermanni, *Pfr.*	discoidea, spira plana, rotundata.	latissimus, $\frac{1}{2}$ diametri.	conferte costulata.	cornea, nitidula.	2	1	$4\frac{1}{2}$	E. Mexico, S. Guatemala.
wilhelmi, *Pfr.* .	depresse turbinata, spira conoidea, rotundata.	latiusculus, $\frac{1}{3}$–$\frac{1}{4}$ diametri.	subtiliter inæqualiter striatula.	rufo-fusca, nitidula.	3	2–$2\frac{1}{2}$	4	E. Mexico, Centr. Guatemala, Centr. Costa Rica.
conspurcatella, *Morel.*	depressa, infra tumida, rotundata.	latus.	membranaceo-striatula.	cornea.	$3\frac{1}{2}$		3–4	? E. Mexico, Yucatan, N. Guatemala, Honduras.
impura, *Pfr.* ...	,,	mediocris.	rugoso-costulata, lineis membranaceis obliquis.	corneo-fusca.	4–$4\frac{1}{2}$	3–$3\frac{1}{2}$	$4\frac{1}{2}$–5	E. & S.W. Mexico.
paleosa, *Streb.* .	trochiformis, subangulata.	,,	subtiliter costulata, lineis membranaceis obliquis.	rufo-fusca.	$4\frac{1}{2}$	$3\frac{1}{2}$	5	E. Mexico.
turbinella, *Morel.*	,,	angustus.	irregulariter rugosa.	albido-virens.	5	4	5	N. Guatemala.

A. *Spire flat; whorls rounded*, 4–5. (Patula, sensu str.)

1. Patula mazatlanica.

Helix mazatlanica, Pfr. in Malak. Blätt. iii. p. 43 (1856)[1]; Monogr. Helic. Vivent. iv. p. 89[2]; Carpenter, Suppl. Report Moll. W. Coast of N. Am. p. 573[3]; Bland, Ann. Lyc. N. York, viii. p. 164, fig. 9[4]; Binney & Bland, Land and Fresh-water Shells N. Am. i. p. 82, fig. 144[5]; v. Mart. Conch. Mittheil. ii. p. 180, t. 33. figg. 10–12[6].

Helix (*Patula*) *mazatlanica* (Pfr.), Fisch. & Crosse, Miss. Scient. Moll., Mollusca, i. p. 231[7].

Pseudohyalina mazatlanica (Pfr.), Morse, Journ. Portland Soc. i. p. 16, t. 7. fig. 35 (1864)[8]; Tryon, Am. Journ. Conch. ii. p. 266, t. 19 (4). fig. 59 (1866)[9]; Cooper, Am. Journ. Conch. v. p. 201 (1870)[10].

Patula mazatlanica (Pfr.), Strebel, Beitr. Mex. Land- und Süssw.-Conch. iv. p. 29[11].

Hab. North America: ? Lone Mountain, near San Francisco, in rotten oak-stumps (*Cooper*[10]).

N.W. Mexico: Mazatlan (*E. Klocke*[1 9 11]).

According to Binney [Terr. air-breath. Moll. N. Am. v. pp. 21, 168 (1878), and

Manual of Am. Land-Shells, pp. 22, 87, 261 (1885)], the Californian locality is doubtful.

2. **Patula hermanni.**

Helix hermanni, Pfr. in Malak. Blätt. xiii. p. 80 (1866)[1]; Monogr. Helic. Vivent. v. p. 175[2].
Helix (*Patula*) *hermanni* (Pfr.), Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 233, t. 10. figg. 4, 4 *a*, *b*[3].
Patula hermanni (Pfr.), Strebel, Beitr. Mex. Land- und Süssw.-Conch. iv. p. 29, t. 4. fig. 8[4]; Pilsbry, Proc. Acad. Phil. 1891, p. 314[5].

Hab. E. Mexico: Mirador (*Berendt* [1–4]); Orizaba, 500 feet above the town (*Heilprin* [5]).
S. Guatemala: Volcan de Agua, in the woods, at an elevation of about 9000 feet, amongst moss (*Stoll*).

B. *Spire raised; whorls rounded; umbilicus moderate, deep.* (Microconus, Strebel.)

3. **Patula wilhelmi.**

Helix wilhelmi, Pfr. in Malak. Blätt. xiii. p. 79 (1866)[1]; Monogr. Helic. Vivent. v. p. 137[2].
Helix (*Patula*) *wilhelmi*, Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 230, t. 10. figg. 5, 5 *a*, *b*[3].
Microconus wilhelmi (Pfr.), Strebel, Beitr. Mex. Land- und Süssw.-Conch. iv. p. 29, t. 4. fig. 7[4].

Hab. E. Mexico: Mirador (*Berendt* [1–4]).
Central Guatemala: Salama (*coll. A. Morelet*, one specimen).
Central Costa Rica: San José, at 1135 metres above the sea, among moss (*P. Biolley*); San José and San Francisco de los Rios, 1100 metres above the sea, in the hedges surrounding the coffee-plantations (*H. Pittier*).

This species looks somewhat like the European *P. rupestris*. Strebel suggests[4] that its riblets may be provided with cuticular lappets or hairlets in a very fresh state, which would bring it near the following section, *Thysanophora*.

C. *Cuticular lamellæ in oblique rows, crossing the riblets. Spire more or less raised; whorls rounded or scarcely subangulated; umbilicus moderate or rather narrow.* (Thysanophora, Strebel.)

4. **Patula conspurcatella.**

Helix conspurcatella, Morelet, Test. Noviss. ii. p. 7 (1851)[1]; Pfr. Monogr. Helic. Vivent. iii. p. 97[2].
Helix (*Patula*) *conspurcatella* (Morel.), Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 232, t. 12. figg. 3, 3 *a–c*[3].
Thysanophora conspurcatella (Morel.), Strebel, Beitr. Mex. Land- und Süssw.-Conch. iv. p. 31[4].
Patula conspurcatella (Morel.), Pilsbry, Proc. Acad. Phil. 1891, p. 314[5].
? *Helix horni* (Gabb), Ancey, Ann. de Malac. ii. p. 240 (1886)[6].

Hab. E. Mexico: Vera Cruz (*Heilprin* [5]).

YUCATAN: Merida, under stones (*Morelet* [1–4], *Heilprin* [5]); Tunkas and Tekanto (*Heilprin* [5]).

N. GUATEMALA; Tenosique and Flores, province of Peten (*Morelet* [3]).

? HONDURAS: Utilla Island (*Simpson* [6]).

Known only from Morelet's description, and a somewhat doubtful not full-grown specimen in the Berlin Museum, given by the late dealer L. Parreyss of Vienna, and described by Strebel [4]. I cannot help suspecting that Ancey's *Helix horni* [6] may belong to the same species. *H. horni*, Gabb, is from Arizona, and the description of it nearly agrees with *P. conspurcatella*.

5. **Patula impura.**

Helix impura, Pfr. in Malak. Blätt. xiii. p. 79 (1866) [1]; Monogr. Helic. Vivent. v. p. 137 [2].
Helix (*Patula*) *impura* (Pfr.), Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 229 [3].
Thysanophora impura (Pfr.), Strebel, Beitr. Mex. Land- und Süssw.-Conch. iv. p. 30, t. 4. fig. 2 [4].
Patula impura (Pfr.), Pilsbry, Proc. Acad. Phil. 1891, p. 314 [5].

Hab. E. MEXICO: Mirador, near Jalapa (*Berendt* [1–4]); Vera Cruz (*Heilprin* [5]).
S.W. MEXICO: Yautepec, Morelos (*Heilprin* [5]).

It is somewhat doubtful if *P. impura* is really distinct from *P. conspurcatella*.

6. **Patula paleosa.**

Thysanophora paleosa, Strebel, Beitr. Mex. Land- und Süssw.-Conch. iv. p. 30, t. 4. fig. 3 [1].
Patula paleosa (Streb.), Pilsbry, Proc. Acad. Phil. 1891, p. 314 [2].

Hab. E. MEXICO: woods of Pacho, near Jalapa (*Strebel* [1]); Orizaba, on hills, 500 feet above the town (*Heilprin* [2]).

7. **Patula turbinella.** (Tab. VII. figg. 2, 2 *a*, *b*.)

Helix turbinella, Morelet, Test. Noviss. ii. p. 9 (1851) [1]; Pfr. Monogr. Helic. Vivent. iii. p. 58 [2].
Helix (*Patula*) *turbinella* (Morel.), Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 229, t. 12. figg. 2, 2 *a–c* [3].

Hab. N. GUATEMALA: woods of Peten, very rare (*Morelet* [1–3]).

The single specimen of this species kindly lent me for examination by M. A. Morelet is elegantly trochiform, only subangulated, of a pale greyish colour, somewhat yellowish near the aperture, with very oblique, somewhat unequal, distinct striæ. Our figure is taken from this shell.

HELIX.

Helix, Linnæus, Syst. Nat. ed. 10, p. 678 (1758); Draparnaud, Hist. Nat. Moll. Terr. et Fluv. de la France, p. 78 (1805); Albers, Die Helic. ed. 2, p. 80.

Shell globose, depressed, or trochiform; aperture with reflexed edges, generally without plaits. Jaw ribbed. Marginal teeth of the radula short, with several cuspids.

Genital apparatus ordinarily with various appendages, as a flagellum on the penis, one, two, or numerous glandulæ mucosæ, and a thick-walled bag (dart-sac) producing a calcareous dart.

Without doubt, this genus, as it is here circumscribed, must, eventually, be still more dismembered. *Solaropsis* and *Oxychona* will probably prove to be generically distinct; but as their anatomy is very little known as yet, I prefer for the present to treat them as subgenera of *Helix*.

Table of Subgenera.

Nomen.	Forma.	Sculptura.	Coloratio.	Apertura.	Magnitudo.	Patria.
Acanthinula.....	subglobosa, perforata.	rugulosa vel striolata.	cornea vel fusca, unicolor.	simplex, recta.	mm. 1⅔–3	Florida, and E. Mexico–Nicaragua.
Vallonia	depressa, umbilicata.	sublævis (vel costulata).	albida.	circularis, reflexa.	3	Centr. Guatemala (circumboreal).
Trichodiscina ...	,,	granulata et pilosa.	fusco-cornea, plerumque fasciata.	perobliqua, leviter reflexa.	8–17 (30)	E. and Centr. Mexico–S. Costa Rica.
Praticolella ...	globosa, perforata.	sublævis.	fulva vel albida, sæpius fasciata.	subverticalis, reflexa.	8–15	Texas, and N. Mexico–Nicaragua.
Arionta	,,	striatula vel rugulosa-punctata.	flavescens, fusco-unifasciata.	sat obliqua, reflexa.	12–19	N., N.W., and E. Mexico.
Pomatia.....	globosa, perforatione obtecta.	striata.	fasciata.	subverticalis, ampla, reflexa.	30–38	Centr. Mexico (introduced) (Europe &c.).
Lysinoë	globosa vel depresse globosa, perforata.	granulato-pilosa.	,,	,,	26–70	N. Mexico–Salvador and Mosquito Coast.
Oxychona	trochiformis vel lenticularis.	lævis, nitida.	albida, fusco-fasciata vel guttata.	subhorizontalis, late reflexa.	15–38	N. Guatemala–S.E. Costa Rica.
Solaropsis.....	depressa, infra tumida, umbilicata.	granulata.	flavescens, rufo-variegata.	subperpendicularis, lunata, breviter reflexa.	20 (60)	S.E. Costa Rica.

Subgen. Acanthinula, Beck.

Shell small, thin, unicolorous, horny, rather globose; umbilicus small; peristome thin, straight, or a little reflexed.

Under this head may provisionally be included, until the anatomical characters are known, several small shells which differ from *Guppya* by the surface not being so smooth and glossy, and from *Patula* by the very small umbilicus. In general appearance they more or less approach the European *Helix* (*Acanthinula*) *aculeata*, Müll., in which the presence of a dart and a flagellum has been stated by A. Lehmann, Die lebend. Schnecken u. Muscheln Stettins, 1873, t. 11. fig. 32.

COMPARATIVE TABLE OF THE SPECIES OF THE SUBGENUS *ACANTHINULA*.

Nomen.	Forma.	Basis.	Sculptura.	Coloratio.	Peristoma.	Diam.	Alt.	Anfr.	Patria.
cæcoides, *Tate* ...	conoideo-globosa.	perforata.	lamellæ rugulosæ, obliquæ.	corneo-fusca.	rectum.	mm. 3	mm. 3	4	Honduras, Centr. Nicaragua.
granum, *Strebel*...	,,	,,	costulæ obsoletæ et rugulæ obliquæ.	pallide cornea.	,,	2·8	2·8	4¼	Florida, E. Mexico, Yucatan.
punctum, *Morel.* .	globoso-turbinata.	(obtecte) perforata.	?	corneo-rufa.	,,	1⅔	1⅔	3½	S.E. Mexico, Yucatan.
guatemalensis, *Cr. & Fisch.*	turbinato-globosa.	perforata.	oblique striolata.	cornea.	,,	2	2	4	N. & W. Guatemala.
intonsa, *Pilsbry*...	elate globoso-turbinata.	anguste umbilicata.	levissime striatula, sparsim pilosa.	castanea.	,,	1·8	2	6	E. Mexico.

1. Helix cæcoides.

Helix cæcoides, Tate, Am. Journ. Conch. v. p. 155, t. 16. fig. 2 (1870)[1]; Pfr. Monogr. Helic. Vivent. vii. p. 77[2].

Pseudohyalina cæcoides (Tate), Ancey, Ann. de Malac. ii. p. 239 (1886)[3].

Hab. HONDURAS: Utilla Island[3].

CENTRAL NICARAGUA: Chontales forest, amongst moss on trees, in company with *Guppya gundlachi* (*Tate*[1]).

2. Helix granum.

Acanthinula granum, Strebel, Beitr. Mex. Land- und Süssw.-Conch. iv. p. 31, t. 4. fig. 13[1]; Binney, Terr. air-breath. Moll. N. Am., Suppl. iii. (Bull. Mus. Comp. Zoöl. Harv. Coll. xix.) p. 200, with fig.[2] (nec *Helix granum*, Pfr.).

Patula granum (Streb.), Pilsbry, Proc. Acad. Phil. 1891, p. 314[3].

Hab. NORTH AMERICA: Florida[2].

E. MEXICO: Hacienda de Mirador, near Jalapa (*Strebel*[1]).

YUCATAN: Progreso, an albino specimen (*Heilprin*[3]).

The sculpture of this shell somewhat resembles that of *Patula*, section *Thysanophora*.

3. Helix punctum. (Tab. VII. figg. 3, 3 *a*, *b*.)

Helix punctum, Morelet, Test. Noviss. ii. p. 9 (1851)[1]; Pfr. Monogr. Helic. Vivent. iii. p. 43[2].

Helix (*Patula*) *punctum* (Morel.), Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 228, t. 12. figg. 1, 1 *a*, *b*[3].

Hab. S.E. MEXICO: San Juan Bautista, Tabasco (*H. H. Smith*).

YUCATAN: Merida, in the gardens of the city, upon the leaves of trees (*Morelet*[1–3]).

Seems to be distinct from *H. granum* by its smaller size and somewhat smoother

surface, the umbilicus being, in Morelet's specimen, covered for about one-third of its circumference by the margin of the aperture. In the Tabasco example the umbilicus is a little more open. We figure a specimen from Morelet's collection, as it differs somewhat in outline from the one given by Fischer and Crosse [3].

4. **Helix guatemalensis.**

Helix guatemalensis, Crosse & Fisch. Journ. de Conch. xx. p. 222 (1872) [1], and xxi. p. 274, t. 9. fig. 3 (1873) [2].

Pseudohyalina guatemalensis, Ancey, Ann. de Malac. ii. p. 240 (1886) [3].

Hab. N. Guatemala: probably Coban (*Sarg* [1 2]).

W. Guatemala: Retalhuleu, Pacific slope (*Stoll*).

Stoll's specimens are somewhat larger and higher (3 millim. in both dimensions) than Crosse and Fischer's type, but in other respects they agree with it.

5. **Helix intonsa.**

Patula intonsa, Pilsbry, Proc. Acad. Phil. 1891, p. 314, t. 15. figg. 1–3 [1].

Hab. E. Mexico: Orizaba (*Heilprin* [1]).

Subgen. Vallonia, Risso.

Shell small, depressed, rounded; umbilicus rather wide; peristome thick, reflexed. No glandulæ mucosæ. Dart long, smooth, simple.

H. pulchella, Müll. Depressa, modice umbilicata, sublævis, albida, peristomate subcirculari, late reflexo. Diam. maj. 3, alt. $1\frac{1}{2}$, anfr. $3\frac{1}{2}$ millim.—Circumboreal.

6. **Helix pulchella.**

Helix pulchella, O. Fr. Müller, Hist. Verm. ii. p. 30 (1774) [1]; Draparnaud, Hist. Nat. de Moll. Terr. et Fluv. de la France, p. 112, t. 7. figg. 33, 34 [2]; Voith, in Sturm's Deutschl. Fauna, vi., Würmer, part 3, t. 12 (living animal) (1813) [3]; Rossmässler, Icon. d. Land- und Süssw.-Moll. ii. p. 5, t. 31. fig. 440 [4]; Pfr. Monogr. Helic. Vivent. i. p. 365 [5]; Forbes & Hanley, Hist. Brit. Moll. iv. p. 78, t. 119. figg. 8–13 [6]; Moquin-Tandon, Hist. Nat. de Moll. Terr. et Fluv. de la France, ii. p. 140, t. 11. figg. 34 (shell), 28–30 (anatomy) [7]; Albers, Die Helic. ed. 2, p. 101 [8]; Jeffreys, Brit. Conch. i. p. 224, and v. t. 14. figg. 1 *a*, *b* [9]; L. v. Schrenck, Reisen im Amur-Lande, ii. p. 681 [10]; Binney & Bland, Land and Fresh-water Shells of N. Am. i. p. 157, fig. 270 [11]; Terr. air-breath. Moll. N. Am. ii. p. 175, t. 17. fig. 1 [12]; Lehmann, Lebend. Schnecken u. Muscheln Stettins, p. 90, t. 11. fig. 30 (anatomy) [13].

Helix minuta, Say, in Journ. Acad. Phil. i. p. 123 (1817) [14].

Vallonia pulchella (Müll.), Binney, Terr. air-breath. Moll. N. Am. v. p. 344 [15]; Manual of Am. Land-Shells, p. 77 [16].

Hab. Central Guatemala: Antigua, in gardens, probably introduced (*O. Stoll*, 1878).

Widely distributed throughout the whole of Europe, from Norway ($62\frac{1}{2}°$ N. lat.) and

Russia (66½° N. lat.) to Sicily, Algeria, and Syria; also in Siberia and Tibet; introduced in Madeira [5]; within North America from Canada [11 15] to Florida [11], Idaho [15], Colorado [15], New Mexico [15], and Arizona [15].

Subgen. TRICHODISCINA.

Trichodiscus, Strebel, Beitr. Mex. Land- und Süssw.-Conch. iv. p. 32 (1880) (preoccupied in the Infusoria by Ehrenberg).

Shell of moderate size, finely granulate and hairy, more or less flat above, umbilicated; peristome slightly reflexed above, more distinctly beneath. Jaw with strong ribs.

The anatomy of this subgenus is only imperfectly known: see Strebel, *loc. cit.* p. 33.

For Table of Species, see page 134.

7. Helix coactiliata.

Helix coactiliata, Deshayes, in Férussac's Hist. Nat. Moll. terr. i. p. 18, t. 72. figg. 1–5 (before 1838) [1]; Pfr. Monogr. Helic. Vivent. i. p. 200 [2], and in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, *Helix,* ii. p. 165. no. 610, t. 95. figg. 23–25 (not adult) [3]; Reeve, Conch. Icon. vii., *Helix,* t. 107. fig. 595 [4]; Tristram, P. Z. S. 1861, p. 230 [5]; Guppy, P. Z. S. 1875, p. 318 [6].

Helix (*Patula*) *coactiliata* (Fér.), Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 234 (excl. var.) [7].

Trichodiscus coactiliatus (Fér.), Strebel, Beitr. Mex. Land- und Süssw.-Conch. iv. p. 34 [8].

Patula coactiliata (Fér.), Pilsbry, Proc. Acad. Phil. 1891, p. 314 [9].

Helix tæniata, Nyst, in litt. [10].

Helix nystiana, Pfr. P. Z. S. 1845, p. 130 [11].

Helix bridgesi, Tryon, Am. Journ. Conch. ii. p. 303, t. 20. figg. 9, 10 (1866) (nec Newcomb) [12].

Helix parkeri, Tryon, loc. cit. iii. p. 106 [13]; Pfr. Monogr. Helic. Vivent. vii. p. 175 [14].

Hab. S.E. MEXICO: Tabasco (*Nyst* [2 3]).

YUCATAN: Tunkas and Labna (*Heilprin* [9]).

BRITISH HONDURAS: Belize (*Bocourt* [7]).

N. GUATEMALA (*Salvin* [5]).

E. GUATEMALA: near Livingston, Bay of Honduras (*O. Stoll*).

W. NICARAGUA: Realejo (*coll. Cuming* [2 3 11]); Nicaragua (*Bridges* [12–14]).

According to Tate and Guppy [6] *, *H. coactiliata* is also found in Venezuela and Trinidad.

The flattest species in this subgenus; usually five bands are present, the uppermost near the suture (sometimes wanting), a second and third also on the upper side of the

* Guppy's statement that this species also occurs in Peru is apparently a mistake, caused probably by Deshayes referring the locality—Tuspan—of his *H. coactiliata*, var. β (our *H. cordovana*), to Peru instead of Mexico.

Comparative Table of the Species of the Subgenus *Trichodiscina*.

Nomen.	Forma.	Umbilicus.	Sculptura.	Coloratio.	Apertura.	Diam.	Alt.	Apert.	Anfr.	Patria.
coactiliata, *Fér.*	discoidea, spira plana, rotundata.	latissimus, $\frac{2}{3}$ diametri.	confertim granulata, brevipilosa.	pallide cornea, fasciis rufis angustis 2–3 superis, 2 inferis.	perobliqua, leviter expansa.	mm. 11	mm. 4	mm. $4\frac{1}{2}$	4	S.E. Mexico, Yucatan, Belize, N. & E. Guatemala, W. Nicaragua.
cordovana, *Pfr.*	plana, subinflata, spira prominula.	latus, $\frac{1}{3}$ diam.	,,	griseo-cornea, fascia plerumque una peripherica.	,,	$8\frac{1}{2}$ | 12	$3\frac{1}{2}$ | 5	3 | 4	$4\frac{1}{2}$	E. & S.W. Mexico.
suturalis, *Pfr.*	inflata, spira prominula, medio plana.	mediocris, $\frac{1}{5}$ diam.	,,	fusco-cornea, concolor aut unifasciata.	,,	12	7	5	4	S.E. Mexico, N. and Central Guatemala, Honduras.
——, var. pressula, *Morel.*	spira convexa.	,,	,,	flavo-cornea, unifasciata.	minus obliqua.	12	8	$5\frac{1}{2}$	$4\frac{1}{2}$	N., Centr., & W. Guatemala, Centr. Costa Rica.
oajacensis, *Pfr.*	depresse conoidea, subangulata.	latiusculus.	,,	pallide cornea, fasciis 2 latis, umbilico fusco.	perobliqua, leviter expansa.	16	$8\frac{1}{2}$	6	$4\frac{1}{2}$	S.W. Mexico.
sumichrasti, *Cr. & Fisch.*...	supra subplana, infra convexa, obtuse carinata.	mediocris, $\frac{1}{4}$ diam.	grossiuscule oblique striata et lacinulata.	fusco-grisea, concolor.	subhorizontalis, ovata, continua, reflexa, alba.	17	7	6	$4\frac{1}{3}$	E. & S.W. Mexico.
? sargi, *Cr. & Fisch.*.....	subdepressa, spira prominente subangulata.	latus, prope $\frac{1}{3}$ diam.	striatula.	corneo-fusca, unicolor.	obliqua, expansa, alba.	$26\frac{1}{2}$ | 31	14 | 16	13	5	N. Guatemala.
? macneili, *Crosse*	discoidea, supra paullulum immersa, rotundata.	latus, $\frac{1}{3}$ diam.	punctato-subpilosa. sulcis impressis 2 pone aperturam.	fuscescenti-grisea, obsolete trifasciata.	subhorizontalis, leviter expansa, marg. columellari unituberculato.	14	$5\frac{1}{3}$ | 6	5	$4\frac{1}{2}$	S.W., E., & S.E. Costa Rica.

last whorl, the fourth and fifth on the lower side, all at about equal distances, only the second and third somewhat nearer to each other.

A not full-grown calcified specimen from Uhde's collection, now in the Berlin Museum, is marked "Vera Cruz"; perhaps it came from the southern part of that province, which borders on Tabasco.

The specific name refers to the rough hairy surface of the shell, the Latin word "*coactilia*," neutr. plur., signifying coarse cloths or felt-coverlets.

8. **Helix cordovana.**

Helix coactiliata, var. *b* (testa superne unizonata), Deshayes, in Férussac's Hist. Nat. Moll. terr. i. pp. 18, 19 [1].

Helix cordovana, Pfr. P. Z. S. 1856, p. 318 [2]; Monogr. Helic. Vivent. iv. p. 295 [3].

Helix (*Patula*) *coactiliata*, var. *β. cordovana*, Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 234, t. 12. figg. 4, 4 *a–c* [4].

Trichodiscus cordovanus (Pfr.), Strebel, Beitr. Mex. Land- und Süssw.-Conch. iv. p. 32, t. 3. fig. 5, t. 11. figg. 1 (radula), 10 (jaw), 17 [5].

? *Helix obsita*, Pfr. in Malak. Blätt. v. p. 80 (1866) [6]; Monogr. Helic. Vivent. v. p. 170 [7].

Hab. S.W. Mexico: Omilteme, State of Guerrero (*H. H. Smith*); Oaxaca (*Höge*).

E. Mexico: Tuspan, south of Tampico [1]; Nacimiento de Quilate, Cerro de Espaldilla, and Rancho de Guerrero, all in the environs of Misantla, and Nautla (*E. Salas* [5]); Chirimoyo, Coatepec, Dos Arroyos, Soncoautla, Consolapa, and Barranca de Teocelo, all in the vicinity of Jalapa (*E. Salas* [5]); Hacienda de Mirador, on old rotten wood (*Berendt and Strebel* [5 6 7]): Misantla, Soledad, Almolonga (*Höge*); Cordova (*Sallé* [2 3 4], *Höge*).

Distinct from the preceding, *H. coactiliata*, by its less flattened shape and less enlarged umbilicus. In most specimens only one band is to be seen, corresponding to the third band of the preceding species but somewhat larger, above the periphery; in some examples it is not visible, especially if the hairs are well preserved. A somewhat darker hue of the general colour occupies on the upper side the places where the first and second bands should be, together with the space between them, and in the same manner on the lower side the place of the fourth and fifth bands with the space between them, so the general pale colour is limited to the sutural and umbilical regions and a small stripe on either side of the (third) band. Strebel [5] states that he has a calcified specimen from Misantla in which the five bands are distinctly present, and Pfeiffer [2] mentions two bands on the upper side in his *H. cordovana*, none in his *H. suturalis*. As regards the size, there is also a remarkable variability. Strebel states that his largest specimens, up to 11·8 millim. in diameter, are from the environs of Misantla, and Pfeiffer gives to his *H. cordovana* even $12\frac{1}{3}$ millim.; the usual size of full-grown specimens is diam. 11 millim.

9. **Helix suturalis.**

Helix suturalis, Pfr. P. Z. S. 1846, p. 37 [1]; Monogr. Helic. Vivent. i. p. 201 [2]; Reeve, Conch. Icon. vii., *Helix*, t. 61. fig. 301 and t. 110. fig. 625 [3].
Discus suturalis, H. & A. Adams, Gen. Moll. ii. p. 117 [4].
Helix (*Patula*) *coactiliata*, var. γ. *suturalis*, Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 234 [5].

Hab. S.E. Mexico: Teapa in Tabasco (*Höge*).
N. Guatemala: San Luis, Peten (*Morelet* [5]).
Central Guatemala: San Gerónimo, near Salama (*Champion*).
Honduras (*Dyson* [1–5]).

Var. *pressula*: spira convexa. (Tab. VII. figg. 4, 4 *a*, *b*.)

Helix pressula, Morelet, Test. Noviss. ii. p. 8 (1851) [6]; Pfr. Monogr. Helic. Vivent. iii. p. 156 [7].
Helix (*Patula*) *pressula* (Morel.), Fisch. & Crosse, loc. cit. p. 236, t. 12. figg. 5, 5 *a–c* [8].
Trichodiscus pressulus (Morel.), Strebel, Beitr. Mex. Land- und Süssw.-Conch. iv. p. 34 [9].
Helix almonte, Tristram, P. Z. S. 1863, p. 411 [10]; Pfr. Monogr. Helic. Vivent. v. p. 142 [11].
Helix (*Patula*) *almonteana* (Tristr.), Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 231 [12].

Hab. N. Guatemala: Purula, in the upper valley of the Polochic river (*Champion*); Vera Paz (*Salvin* [10–12]).
W. Guatemala: Las Mercedes, in the Costa Cuca, Pacific slope, in the coffee-plantations (*Champion*); in virgin forest, at Istapa, near San José, on the shore of the Pacific (*Morelet* [6–9]).
Central Guatemala: on the limestone mountain "La Pedrera," north of the city of Guatemala, on the ground under *Mimosa*-shrubs, and on the branches of trees covered with *Bromeliaceæ*, during the dry season locked up by a thin membranous epiphragma (*Stoll*).
Central Costa Rica: La Urraca, near San José (*Biolley*: var. without band).

The specimens I have seen from Teapa, San Gerónimo, La Pedrera, and Las Mercedes are not all full-grown, with straight thin peristome, but they are easily distinguishable from *H. cordovana* of the same age and size by the inflated form of the shell; also the colour is more reddish-brown or yellowish; the band is similar. The spire is either quite flat, with somewhat deepened centre, as described by Pfeiffer [1], or more or less convex, as figured by Fischer and Crosse [8]; but there are no other differences between the typical form and the variety.

Our figure is taken from the Purula specimen. Tristram's species [10–12] is founded on a not full-grown specimen.

10. **Helix oajacensis.**

Helix oajacensis (L. Koch, MS.), Pfr. Symb. Hist. Helic. ii. p. 35 (1842) [1]; Monogr. Helic. Vivent. i. p. 203 [2], and in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, *Helix*, ii. p. 337, no. 848, t. 132. figg. 3, 4 [3]; Philippi, Abbild. neuer Conch. i. 2, p. 23, t. 2. fig. 6 [4].

Helix (*Discus*) *oajacensis* (Koch), Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 237 [5].
Trichodiscus oajacensis (Koch), Strebel, Beitr. Mex. Land- und Süssw.-Conch. iv. p. 35 [6].

Hab. S.W. Mexico: Oaxaca (*Hegewisch* [1–6]).

A somewhat doubtful species. According to the quoted descriptions and figures *H. oajacensis* seems to be sufficiently distinct from *H. suturalis* by the more elevated spire, the angulated periphery, and the two large dark chestnut bands. But it has not again been found, so far as is known. Strebel [6] thinks that it may have been an aberrant specimen of the preceding species. Höge has found at the same locality, Oaxaca, a quite normal *H. suturalis*, which with a diameter of 8 millim. has no trace of a keel; whereas *H. oajacensis*, with a diameter of 15 millim., according to Pfeiffer ($16\frac{1}{2}$ millim. in Philippi's figure), is said to be "obtuse carinata."

11. **Helix sumichrasti.**

Helix sumichrasti, Crosse & Fisch. in Journ. de Conch. xx. p. 147 (1872) [1], and xxi. p. 265, t. 9. figg. 4, 4 *a* (1873) [2].

Hab. E. Mexico: Soledad, between Cordova and Orizaba (*Höge*).
S.W. Mexico: Isthmus of Tehuantepec (*Sumichrast* [1 2]).

Quite distinct by the keel of the shell.

The locality "La Huallaga," Tehuantepec, quoted by Crosse and Fischer is probably a mistake for Laoyaga (sometimes written Laollaga).

12. **Helix sargi.**

Helix sargi, Crosse & Fisch. Journ. de Conch. xx. p. 146 (1872) [1], and xxi. p. 277, t. 9. fig. 2 (1873) [2]; v. Mart. P. Z. S. 1875, p. 648 [3].

Hab. N. Guatemala: in the woods of Tamahu, Vera Paz (*Sarg* [1 2]); Coban (*Salvin* [3]).

H. sargi appears to be nearer to the subgenus *Trichodiscina* than to *Lysinoë*, but the authors do not mention any hairs or elevated points in their description of the species. Or it may, perhaps, be an angulated species of the section *Praticolella*.

13. **Helix macneili.**

Helix mac-neili, Crosse, Journ. de Conch. xxi. p. 67 (1873) [1], and xxii. p. 71, t. 2. fig. 3 (1874) [2]; Pfr. Monogr. Helic. Vivent. vii. p. 451 [3]; Angas, P. Z. S. 1879, p. 476 [4].

Hab. S.W. Costa Rica, Terraba, on the banks of small streamlets (*H. Pittier*).
E. & S.E. Costa Rica: coast region and lower hills from Parismina to the hills of Zhorquin (*Gabb* [4]); Chiriqui lagoon (*MacNeil* [1–3]).

Very peculiar by two infolded spots in the last whorl, somewhat like those in *Helix* (*Solaropsis*) *pellis-serpentis*, Chemnitz, but in other respects agreeing well with the species of the subgenus *Trichodiscina*. The specimen collected by H. Pittier exhibits

a dark brown, somewhat velvety, periostracum, and on the spots where this is lost a very fine punctuation of the shell, which leads me to believe that the most natural place for this species may be in the subgenus *Trichodiscina*. With *H.* (*Solaropsis*) *tiloriensis* there is not much similarity in the general appearance.

Crosse [1–3] erroneously refers the locality "Chiriqui lagoon" to Nicaragua.

Subgen. Praticolella.

Dorcasia (Gray), Binney, Terr. air-breath. Moll. N. Am. v. (Bull. Mus. Comp. Zoöl. Harv. Coll. iv.) p. 346 (1878).

Praticola, Strebel u. Pfeffer, in Strebel's Beitr. Mex. Land- und Süssw.-Conch. iv. p. 38 (1880) (preoccupied by Swainson, 1837, and as *Pratincola* by K. L. Koch, 1816, both in Birds).

Shell globose, of moderate size, perforated, smooth, or slightly striated; peristome rather thickly tipped and reflexed. Jaw with flat, broad ribs.

Glandula mucosa simple; retractor penis with double insertion (see Leidy, in Binney's Terr. air-breath. Moll. N. Am. i. p. 255, and Pfeffer in Strebel's Beitr. loc. cit. p. 40). Dart-sac simple; dart as yet not described.

Dorcasia, Gray, has as type the South African *H. alexandri* (Zeitschr. für Malak. 1845, p. 87, note), which differs considerably in general appearance. *Eulotella*, Mousson, type *H. similaris*, Fér., agrees more nearly with *Praticolella*.

As the shells of this subgenus resemble in many respects those of the following, we may unite both in one table for facilitating their determination.

14. **Helix ampla.**

Helix ampla, Pfr. in Malak. Blätt. xiii. p. 78 (1866) [1]; Monogr. Helic. Vivent. v. p. 63 [2].

Helix (*Patula*) *ampla*, Fischer & Crosse, Miss. Scient. Mex., Mollusca, i. p. 227 [3] (all not full-grown).

Praticola ocampi, Strebel, Beitr. Mex. Land- und Süssw.-Conch. iv. p. 38, t. 2. figg. 2, 5, and t. 10. figg. 1 (radula), 1 *a* (jaw), 1 A–F (anatomy) [4].

Hab. E. Mexico: Misantla, on meadows, fields of Indian corn, &c., and Rancho de Guerrero near Misantla (*Strebel* [4]); Rio de Misantla (*F. D. Godman*); Almolonga (*Höge*); Jalapa, in company with *Leptomerus* (*Höge*); La Banderilla, Monte de Tataquicapa and Dos Arroyos, all near Jalapa, on grass (*Strebel* [4]); Mirador (*Berendt and Strebel* [1–4]); Consolapa near Coatepec and San Antonio del Monte (*Strebel* [4]).

Somewhat variable with regard to the elevation of the spire; the young shell is obtusely angulated, and a trace of the angulation is sometimes to be seen in the first half of the last whorl.

This species resembles somewhat the widely distributed *H. similaris*, Fér., the range of which extends to Brazil; but is distinct from it by the more globose form, the more

Comparative Table of the Species of the Subgenera *Praticolella* and *Arionta*.

Nomen.	Forma.	Basis.	Sculptura.	Coloratio.	Apertura.	Diam.	Alt.	Apert.	Anfr.	Patria.
Praticolella.						mm.	mm.	mm.		
ampla, *Pfr.*	globosa, levissime subangulata.	semiobtecte perforata.	pruinose striatula.	fulva, concolor.	subverticalis, late lunata, alba, reflexa.	13½ – 15	11 – 11½	8½	5	E. Mexico.
berlandieriana, *Moric.* ...	globosa.	,,	lævis, solidula.	alba, fascia fulva una latiuscula.	parum obliqua, late lunata, crassiuscule reflexa.	9 – 13	7 – 9½	5	4½	Texas, N.E., N.W., E., & W. Mexico.
——, var. griseola, *Pfr.* ...	,,	,,	lævis, testa tenui.	alba, fasciis compluribus latiusculis griseo-pellucidis.	parum obliqua, late lunata, tenuis.	8 – 10	6 – 7	4½ – 5½	4	Texas, N.E. & E. Mexico, N. Guatemala, W. & Centr. Nicaragua.
Arionta.										
flavescens, *Pfr.*	,,	perforata.	sublævis.	griseo-flavida, flavo-variegata, rufo-unifasciata.	obliqua, breviter reflexa.	12 – 13	9	7	4½	E. Mexico; ? Chiapas.
trypanomphala, *Pfr.*	,,	,,	minute punctata.	flavescens, castaneo-unifasciata.	paullum obliqua, subcircularis, leviter reflexa.	20	13	?	4½	? N. Mexico.
——, var. remondi, *Tryon.*	,,	semiobtecte perforata.	,,	,,	,,	16½ – 19	11½ – 13	9	4	N.W. & W. Mexico.
magdalenensis, *Stearns* ...	depressa, spira vix prominula.	latiuscule umbilicata.	striatula.	albida ?, rufo-unifasciata.	modice obliqua, ovata, incrassata, subreflexa.	13	6½	7	4	N.W. Mexico.

solid shell, the brighter reddish fawn-colour, the much narrower umbilicus, and the distinct, though fine, spiral striæ.

Pfeiffer's original specimen was, according to his description [1], nearly full-grown, but not perfect with regard to the peristome. In his collection, now in the possession of H. Dohrn in Stettin, there are two much younger specimens, and one small (11 millim. diam.) but full-grown example with perfect peristome.

15. **Helix berlandieriana.** (Tab. VII. figg. 12, 12, *a*, *b*, 13, 14.)

Helix berlandieriana, Moricand, in Mém. Soc. Phys. et d'Hist. Nat. de Genève, vi. 2, p. 537, t. 1. fig. 1 (1836)[1]; Deshayes, in Lamarck's Hist. Nat. des Anim. sans Vert. ed. 2, viii. p. 133 (1838)[2]; Pfr. in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, *Helix*, ii. p. 275. no. 758, t. 123. figg. 15–18[3], and Monogr. Helic. Vivent. iii. p. 227[4] (not i. p. 155); F. Römer, Texas, p. 455 (Bonn, 1849)[5]; Albers, Die Helic. p. 70[6]; Binney, Terr. air-breath. Moll. N. Am. i. p. 255, t. 8. fig. 11 (anatomy by Leidy)[7], and ii. p. 109, t. 49. fig. 1[8]; Reeve, Conch. Icon. vii., *Helix*, t. 120. fig. 708[9]; v. Mart. in Malak. Blätt. xii. p. 19 (1865)[10]; Binney & Bland, Land and Fresh-water Shells of N. Am. i. p. 159, fig. 276[11].

Helix (*Fruticicola*) *berlandieriana* (Moric.), Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 256[12].

Hygromia berlandieriana (Moric.), Tryon, Am. Journ. Conch. ii. p. 309, t. 22 (5). fig. 4[13].

Dorcasia berlandieriana (Moric.), Binney, Terr. air-breath. Moll. N. Am. v. (Bull. Mus. Comp. Zoöl. Harv. Coll. iv.) p. 347[14]; Manual of Am. Land-Shells (Bull. U.S. Nat. Mus. no. 28), p. 393[15].

Praticola berlandieriana (Moric.), Strebel, Beitr. Mex. Land- und Süssw.-Conch. iv. p. 42[16].

Helix pachyloma, Menke, Zeitschr. für Malak. 1847, p. 32[17]; Pfr. Monogr. Helic. Vivent. i. p. 323[18].

Hab. North America: Arkansas [8 11–15]; Texas [1–5 8–18]; south-west region beyond the Mississippi [8].

N.E. Mexico: State of Tamaulipas (*Couch* [11 12]); Chapatilo (*Binney* [11 12]).

N.W. Mexico: Ventanas near Ciudad, Durango (*Höge*).

E. Mexico: Vera Cruz, with the var. *griseola* (*Höge*).

W. Mexico: Sayula, Jalisco (*Höge*).

Var. *griseola*. (Tab. VII. figg. 15, 15 *a*, 16, 16 *a*, 17.)

Helix cicercula (Férussac, mus. Paris), Deshayes, in Férussac's Hist. Nat. Moll. Terr. i. p. 390, t. 107. figg. 4–10 (1850–51)[19] (nec Beck, 1837, nec A. Gould, 1846).

Brodybæna pisum, Beck, Ind. Moll. p. 18 (1838) (sine descr.)[20].

Helix splendidula, Anton, Verz. Conch. Samml. p. 36 (1839) (sine descr.) (nec Pfr. 1845)[21].

Helix griseola, Pfr. Symb. Hist. Helic. i. p. 41 (1841)[22]; Monogr. Helic. Vivent. i. p. 337[23], and in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, *Helix*, i. p. 342. no. 344, t. 60. figg. 17, 18 (not good)[24]; Reeve, Conch. Icon. vii., *Helix*, t. 64. fig. 327[25]; v. Mart. Malak. Blätt. xiii. p. 18 (1865)[26]; Binney & Bland, Land and Fresh-water Shells of N. Am. i. p. 160. fig. 277[27]; Binney, Terr. air-breath. Moll. N. Am. iv. p. 50, t. 67. fig. 20[28]; Tate, Am. Journ. Conch. v. p. 155 (1870)[29].

Helix (*Fruticicola*) *griseola* (Pfr.), Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 259 [30].
Hygromia griseola (Pfr.), Tryon, Am. Journ. Conch. ii. p. 309, t. 22 (5). fig. 5 [31].
Dorcasia griseola (Pfr.), Binney, Terr. air-breath. Moll. N. Am. v. (Bull. Mus. Comp. Zoöl. Harv. Coll. iv.) pp. 347, 348, fig. 231 (jaw), and t. 7. fig. V (radula) [32]; Manual of Am. Land-Shells (Bull. U. S. Nat. Mus. no. 28), pp. 392, 394, figg. 427 (jaw), 429 [33].
Praticola griseola (Pfr.), Strebel, Beitr. Mex. Land- und Süssw.-Conch. iv. p. 41, t. 2. fig. 8 [34].
Helicogona (*Arionta*) *griseola* (Pfr.), Mörch, in Malak. Blätt. vi. p. 111 (1859) [35].
Helix albocincta, Binney, Terr. air-breath. Moll. N. Am. i. pp. 109, 128 (1851) [36] (nec Pfr. 1845).
Helix albozonata, Binney, loc. cit. iii. t. 49. fig. 2 [37].
Helix albolineata, A. Gould, in Binney's Terr. air-breath. Moll. N. Am. iii. p. 34 (same figure) (1857) [38].

Hab. North America: Indianola and Bosque County, Texas [28 30–33].
N.E. Mexico: State of Tamaulipas (*Couch* [30]).
E. Mexico: Environs of Vera Cruz, frequent (*Hegewisch* [22–24 30], *Sallé* [30], *Uhde and Friedel* [26 30], *Dolfus-Ausset* [30], *Strebel* [34], *Höge*); Cordova, remarkably small specimens, only 8½–10 millim. in diam. (*Höge*).
N. Guatemala: Lake of Flores, Peten (*A. Morelet* [30]).
W. Nicaragua: on the Volcan de Masaya (*Örsted* [35], *Sallé* [30]).
Central Nicaragua: common throughout the savana-region—Masapa, Granada, San Ubaldo, &c., living on the blades of grass and resembling in this habit *H. virgata* (*Tate* [29]).

The examination of a considerable number of specimens collected at Vera Cruz by Höge shows that *H. berlandieriana* and *H. griseola* are connected by many intermediate forms, and that, as I have already suggested in 1865 [26], they cannot be maintained as distinct. The typical *H. berlandieriana* (fig. 12) is a more solid shell, globose, with conical spire, white, with brown band, the margins of the aperture rather thick. Moricand [1] gives to it a diameter of 8 and a height of 7 millim., which does not agree with his figure, this being evidently broader than high. Pfeiffer [18] gives to *H. pachyloma* a diameter of 12 and a height of 9 millim. The largest specimen which I have before me, from Texas, measures even 13 millim. in diameter and 9½ in height; another, comparatively more elevated, also from Texas, 12 millim. in diameter and 10 in height. The smallest specimen (fig. 14), agreeing in form and marking with *H. berlandieriana*, from Vera Cruz, measures 9 millim. in diameter and 7 in height.

The typical *H. griseola* (fig. 15) has a thin shell and a thin peristome; the spire is more depressed; the dimensions are 10 millim. in diameter and only 6 in height; the colour is described as grey, with some white bands, but on comparing the specimens themselves it is evident that this coloration is only the result of the extension of the pale greyish-brown bands at the expense of the white ground-colour. There are other specimens in which the white is not so much reduced (fig. 16); and some which have the upper face quite white, as in *H. berlandieriana*, but the lower face banded as in

H. griseola. In others, again, the bands are very pale, rather pellucid than brown, and visible only by close inspection. The thickness of the shell, the elevation of the spire, and the constriction behind the aperture exhibit also gradual differences, each independently from the other; the constriction exists ordinarily only in the lower half of the whorl, and is there as distinct in many specimens of *H. griseola* as in the typical *H. berlandieriana.* The smallest specimen which I have seen (fig. 13) measures $7\frac{1}{2}$ millim. in diameter and $6\frac{1}{2}$ in height; it exhibits the more conoidal-globose figure of *H. berlandieriana*, but has brown bands on the upper and lower face as in *H. griseola.*

Our fig. 14 is taken from an unusually flat specimen, but otherwise agreeing with typical *H. berlandieriana*; fig 17 represents the var. *griseola* not full-grown, of a pellucid greyish colour, nearly without white.

Helix berlanderiana (sic), Pfr. Monogr. Helic. Vivent. i. p. 165 = *H. virginalis* (Jan), ibid. iii. p. 132, and vii. p. 238, seems to be, according to the description, a very different shell, belonging to *Xerophila*—"testa umbilicata, depressa; peristoma acutum, intus labiatum,"—and probably not really from Texas. A friend of Jan, Villa (Dispos. Syst. Conch. 1841, p. 12), says that *H. virginalis*, Jan, is from Sicily.

Subgen. Arionta, Leach.

Shell globose, of moderate or rather large size, perforated, striated, often one-banded; peristome thickened and distinctly reflexed. Jaw with a few stout ribs. Two long and simple glandulæ mucosæ; receptaculum seminis (genital bladder) with a long filiform appendage. Dart in shape of a spade, two-edged, thickened at the base.

The very characteristic form of the dart of the type of this subgenus, *Helix arbustorum*, L. (see Ad. Schmidt, in Zeitschr. für Malak. 1850, t. 1. fig. 8), is seen also in the North-American *H. mormonum*, Binney (Terr. air-breath. Moll. N. Am. v. t. 13. fig. F).

Leach's original spelling is "*Arianta*;" but as this name is derived etymologically, without doubt, from the Greek *Arion*, a sort of snail mentioned by Ælian (De Natura animalium, x. 5), the spelling "*Arionta*" is preferable.

For Table of Species, see page 139.

16. **Helix flavescens.** (Tab. VII. figg. 18, 18 *a–e.*)

Helix flavescens (Wiegm. in Mus. Berol.), Pfr. Monogr. Helic. Vivent. i. p. 337 (1848) [1]; in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, *Helix,* ii. p. 238. no. 704, t. 112. figg. 14, 15 [2]; Malak. Blätt. iii. p. 231 (1856) [3].

Helix (*Arianta*) *flavescens* (Wiegm.), v. Mart. in Malak. Blätt. xii. p. 18 (1865) [4].

Helix (*Praticola*) *flavescens* (Wiegm.), v. Mart. in Jahrb. Malak. Ges. vii. p. 96, footnote (1880) [5].

Helix (*Leptarionta*) *flavescens* (Wiegm.), Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 255 [6].

Hygromia flavescens, H. & A. Adams, Gen. Moll. ii. p. 214 [7].

Praticola flavescens (Wiegm.), Strebel, Beitr. Mex. Land- und Süssw.-Conch. iv. p. 41, t. 13. fig. 18 [8].

Hab. E. Mexico: Papantla, N. of Misantla (*Deppe* [1 2 4 5 6 8]).
? Chiapas (*Ghiesbreght* [3]).

The shell is pale greyish-yellow, with a reddish-brown band in the periphery and numerous opaque-yellow markings. These markings are either irregularly spread over the surface and of rounded outline, or arranged in numerous spiral lines and more or less contiguous in this direction, but not forming such well-defined bands as is shown in the figure given by Pfeiffer [2]. In one specimen they are very much reduced in number and nearly confined to the sutural region; this shell, unfortunately, has been examined and figured by Strebel [8]. I give therefore new figures from the typical specimens in the Berlin Museum.

17. **Helix trypanomphala.**

Helix trypanomphala, Pfr. in Malak. Blätt. iii. p. 45 (1856) [1]; Monogr. Helic. Vivent. iv. p. 253 [2].
Helix (*Fruticicola*) *trypanomphala* (Pfr.), Fischer & Crosse, Miss. Scient. Mex., Mollusca, i. p. 260 [3].

Hab. Mexico: Sierra Maestra (*Poey* [1–3]).

No Sierra of this name is known to me; perhaps Sierra Madre is intended, or some place in Cuba.

Var. *remondi.*

Helix remondi, Tryon, Proc. Acad. Phil. xv. p. 281, t. 2. fig. 1 (1863) [4]; Pfr. Mon. Helic. Vivent. v. p. 322 [5].
Helix (*Arionta*) *remondi* (Tryon), Fischer & Crosse, Miss. Scient. Mex., Mollusca, i. p. 249 [6].
Arionta remondi, Tryon, Am. Journ. Conch. ii. pp. 318, 325, t. 22 (5). fig. 18 (1866) [7], and iv. p. 240 [8].

Testa perforata, globosa, tenuis, papillis minimis piliferis dense obsita, flavescens, castaneo-unifasciata; spira brevis, convexa; anfr. 4, celeriter crescentes, convexi, ultimus rotundatus, supra et infra subæqualiter convexus; apertura paullum vel vix deflexa, paullum obliqua, subcircularis, peristomate tenui, breviter reflexo, albo, margine columellari ad insertionem dilatato.
Diam. maj. $16\frac{1}{2}$–19, min. 13–15, alt. $11\frac{1}{2}$–13; apert. diam. $9\frac{1}{2}$–$11\frac{1}{2}$, alt. $8\frac{1}{2}$–10 millim.

Hab. N.W. Mexico: Guaymas (*J. G. Cooper* [8]); State of Sinaloa (*Aug. Rémond* [5–7]); Ventanas, near Ciudad, State of Durango (*Forrer and Höge*).
W. Mexico: Tepic and Sayula, State of Jalisco (*W. Richardson*).

I have given a fresh description from the specimens collected by Forrer, Höge, and Richardson, which have satisfied me that *H. remondi* is only a variety of *H. trypanomphala,* distinct by a narrower umbilicus, which occupies about one-sixth of the diameter of the shell.

In its peculiar punctate sculpture this species approaches somewhat the subgenus *Trichodiscina,* from which it differs, however, by the general figure of the shell and the narrow, more or less covered, umbilicus.

H. remondi is identified with *H. carpenteri,* Newcomb, from Upper and Lower Cali-

fornia, by Binney and Bland (Land and Fresh-water Shells of N. Am. i. p. 171), Pfeiffer (Monogr. Helic. Vivent. vii. p. 372), and Binney (Terr. air-breath. Moll. N. Am. v. p. 366, and Manual of Am. Land-Shells, p. 144); but I am unable to follow them in this, because the shell of the latter is expressly stated to have (under the lens) "very minute spiral striations,"—a form of sculpture not visible in the Mexican shells before me, nor agreeing with Tryon's words: "punctate when viewed with a lens." Also the figure given by Binney in both his works represents a more depressed shell, with a somewhat more open umbilicus; while Tryon's figures agree very well with the shell from which my description is taken.

Helix rowelli, Newcomb, from Lower California, may also be near this species, but it has a distinctly larger umbilicus.

18. **Helix magdalenensis.**

Helix (*Arionta*) *magdalenensis*, Stearns, Proc. U. S. Nat. Mus. xiii. p. 207, t. 15. figg. 11–13 (magnified) (1890) [1].

Hab. N.W. Mexico: Magdalena, State of Sonora, among rocks on the top of a mountain, at an elevation of 1000 feet above the town (*Bailey* [1]).

Very depressed, with open umbilicus.

Subgen. Pomatia, Leach.

Shell of relatively large size, globose, rather coarsely striate, with large subvertical aperture and nearly or wholly covered umbilicus. Coloration generally arranged in five bands, some of which may blend into each other or disappear. Jaw with stout ribs. Dart four-edged, crowned at its base. Two clusters of mucous glandulæ.

A European subgenus, one species introduced by man in America.

H. aspersa, Müll. Dilatato-globosa, imperforata, rugulosa et malleata, flavescens, fasciis fusco-marmoratis latiusculis picta; apertura lunato-ovata, breviter reflexa. Diam. 30–38, alt. 25–36, apert. 15–25, anfr. 4–4½ millim.

19. **Helix aspersa.** (Tab. VII. fig. 19.)

Cochlea vulgaris, "major, pulla, maculata et fasciata, hortensis," Lister, Hist. An. Angliæ, ii. p. 113, t. 2. fig. 2, with a figure of the dart (1678) [1].

Helix aspersa, O. Fr. Müller, Hist. Verm. ii. p. 59 (1774) [2]; Draparn. Hist. Nat. Moll. Terr. et Fluv. de la France, p. 89, t. 5. fig. 23 [3]; Férussac, Hist. Nat. Moll. terr. et fluv. t. 18 (varieties of shell), t. 24. fig. 3 (living animal), t. 24 A (copulation, eggs, dart) [4], and Prodr. p. 30, no. 51 (1821) [5]; Rossm. Icon. d. Land- und Süssw. Moll. i. p. 35, t. 1. fig. 3, and t. 22. figg. 294, 295 [6]; Pfr. Monogr. Helic. Vivent. i. p. 241 [7]; Moquin-Tandon, Moll. terr. et fluv. de la France, ii. p. 174, t. 13. figg. 14–32 (anatomy) [8]; Ad. Schmidt, Geschlechts-Apparat d. Stylommatophoren, p. 15, t. 1. fig. 5 (anatomy) (1855) [9]; Jeffreys, Brit. Conch. i. p. 181, t. 6. figg. 7, 8 [10]; Binney & Bland, Land and Fresh-water Shells of N. Am. i. p. 183, fig. 322 [11]; Binney, Terr. air-breath. Moll. N. Am. ii. p. 116 [12]; Stearns, Ann. N.

York Acad. i. p. 129 [13]; Pilsbry, Proc. Acad. Phil. 1891, p. 313 [14]; Schuberth, in Archiv f. Naturg. 1892, p. 48, t. 5. figg. 13, 14 (dart) [15].

Pomatia aspersa (Müll.), Binney, Terr. air-breath. Moll. N. Am. v. p. 380, fig. 266 [16]; Manual of Am. Land-Shells, p. 470, fig. 514 [17], and Suppl. ii. (Bull. Mus. Comp. Zoöl. Harv. Coll. xiii.) p. 24 [18].

Hab. CENTRAL MEXICO: Jaral, in the State of Guanajuato (*Schumann*); very abundant in the environs of the city of Mexico, especially in the park of Chapultepec, introduced (*Heilprin* [14]); Mexico, without nearer indication of locality (*Höge*).

This species, originally from Europe—where it extends from Moray Firth in Scotland to Constantinople,—Northern Africa, Asia Minor, and Syria, has been introduced and acclimatized in :—

NORTH AMERICA: Nova Scotia [11 12 17] and Maine [11 12 17]; Charleston, in gardens [11 12 17] (introduced about 1840), and New Orleans [11 12 17]; San José, in Santa Clara County, California [18] (introduced about 1860); Santa Barbara, California [11 17].

SOUTH AMERICA: Cayenne (*D. Howe*, 1821 [5]); Rio Janeiro (*Prince Neuwied*, 1815–1817 [6]); Santiago, Chili [17].

ANTILLES: Haiti [17].

Also recorded from New Spain (*Humboldt*, 1803–4 [5]). The Mexican specimens sent by Höge, one of which is figured (fig. 19), are of remarkably small size and comparatively rather high—20–30 millim. in diameter, 25–27 millim. in height; those from Jaral are 28–29 millim. in diameter and 24–27 millim. in height.

As regards the solidity of the shell and the coloration—yellowish, with marbled dark greenish-brown bands, one, two, or three above, and two or one broad one below—

(formula: $\overset{\frown}{1\,2\,3}\ \overset{\frown}{4\,5}$, $1\ \overset{\frown}{2\,3}\ \overset{\frown}{4\,5}$, $\overset{\frown}{1\,2\,3}\ 4\,5$, or $1\,2\,3\,4\,5$),

there is no remarkable difference from the normal European specimens.

Binney [12] states that the shells of this species were brought from Spain to New Orleans as an article of food.

Subgen. LYSINOË, Adams.

Aglaia, Albers, Die Helic. ed. 1, p. 107 (1850), ed. 2, p. 122 (1860).
Lysinoë, H. & A. Adams, Gen. Moll. ii. p. 203 (1858).
Odontura, Fischer & Crosse, Miss. Scient. Mex., Mollusca, i. pp. 211, 242 (1870).

The name *Aglaia*, one of the Graces in Greek mythology, has been preoccupied thrice in Zoology (Mollusca, Siphonophora, Aves), and also thrice (including the identical *Aglæa*) in Botany (Dilleniaceæ, Meliaceæ, and Irideæ). The zoological applications, however, are now generally abandoned: *Aglaia*, Renier, 1804 (Mollusca),

Comparative Table of the Species of the Subgenus *Lysinoe*.

Nomen.	Forma.	Basis.	Sculptura.	Coloratio.	Apertura.	Diam.	Alt.	Apert.	A .	Patria.
humboldtiana, *Pfr.*, typica.	elate globosa.	umbilico semi-obtecto.	granulosa.	subcastanea vel fulva, fasciis 3 nigro-fuscis.	parum obliqua, leviter expansa.	mm. 35½	mm. 37	mm. 21	4½	Mexico.
——, var. hegewischi, *v. Mart.*	globosa.	,,	,,	pallida, fasciata, strigis albis.	,,	26 | 28	24 | 26	15	4½	N. and Central Mexico.
——, var. högeana, *v. Mart.*	,,	,,	minute granulosa.	pallide rufescens, fasciis interruptis, strigis albis.	,,	27 | 33	22½ | 28	16 | 19	4½	N. Mexico.
——, var. buffoniana, *Pfr.*	dilatato-globosa.	,,	granulosa et plicata.	subcastanea, fasciis obsoletis, strigis flavidis.	,,	41 | 45	38 | 39	26 | 30	4½	Central Mexico.
——, var. badiocincta, *v. Mart.*	conoideo-dilatata.	,,	minute granulosa.	pallide brunnea, fasciis latioribus distinctis.	,,	40	36	24	4½	Mexico.
eximia, *Pfr.*	globosa.	,,	granosa.	flavescens, fasciis (5) viridi-fuscis.	sat obliqua, expansa, roseo-alba.	37 | 49	28 | 38½	22 | 27	4½	N. & W. Guatemala.
——, var. stolli, *v. Mart.*	depresse globosa.	umbilico magis aperto.	piloso-granosa.	fulva, fasciis fulvis.	,,	41	28	24	21	N. Guatemala.
ghiesbreghti, *Pfr.*, typica.	subdepressa, rotundata.	umbilico angusto.	piloso - granulata, pilis pallidis.	flavo-fulva, fasciis fuscis, basi fusca.	sat obliqua, expansa, roseo-alba.	53 | 70	39 | 52	34 | 36	5½	Chiapas, N. & W. Guatemala, Salvador.
——, var. subaurantia, *v. Mart.*	,,	,,	piloso - granulata, pilis griseis.	basi et fasciis 2 superis aurantiis, 2 mediis fuscis.	,,	70	51	38	5½	N. & W. Guatemala.
——, var. strubelli, *Böttg.*	,,	,,	piloso - granulata, pilis nigris.	aurantio-lutea, fasciis 2 superis obsoletis, fascia media et basi fuscis.	,,	77	50	46	5½	Mosquito coast.
——, var. fulvo-straminea, *v. Mart.*	,,	,,	piloso-granulata.	supra et infra fulvo-straminea, fasciis 3 fuscis.	,,	70	47	?	5½	Central Guatemala.
——, var. bizonata, *v. Mart.*	,,	umbilico subobtecto.	,,	lutescens, fasciis solum 2 fuscis.	,,	64	36	?	5½	Honduras.
——, var. rufo-zonata, *v. Mart.*	,,	,,	,,	fulva, superne rufo-zonata.	,,	57	?	?	?	?

not clearly defined = *Doridium*, Meckel, 1808, and this name generally preferred, also by P. Fischer in his 'Manual'; *Aglaia*, Eschscholtz, 1825 (Siphonophora), has been changed by the author himself in his chief publication, 'System der Acalephen,' 1829, into *Aglaisma*, and this form of the name has been adopted by all later authors, even by Häckel, in vol. xxviii. of the 'Challenger' Report, 1888; *Aglaia*, Swains., 1827 (Aves), is synonymous with *Calliste*, Boie, 1826, older by one year. *Aglaia*, Loureiro, 1780 (Fam. Meliaceæ), is, however, generally adopted by botanists. Therefore, I think it more safe to adopt Adams's name *Lysinoë*. *Odontura* has been proposed by Fischer and Crosse for *H. eximia* and *H. ghiesbreghti*, the latter being the only, and therefore the typical, species of *Aglaia* in Albers's first edition, and the first species of Adams's *Lysinoë*; they are therefore wrong in adopting *Aglaia* for another section of *Helix*, however closely allied, in Journ. de Conch. xxi. p. 277; further, *Odontura* is pre-occupied by Rambur, 1838, in Orthoptera (Locustidæ).

Back of the foot provided with a knobbed keel, the granula of the median line being conspicuously larger than the rest. Jaw with distinct ribs. Two dart-sacs, and, consequently, two darts present. Three simple folliculi mucosi. Flagellum very long, simple.

Shell globose or depressed-globose, beset with granula, and some species also with hairs; brownish or yellowish, with dark spiral bands; umbilicus open or partly covered by the columellar margin; margins of the aperture more or less reflexed, without plaits.

Size rather large.

20. **Helix humboldtiana.** (Tab. VII. figg. 20, 21, 22, 22 *a*.)

a. typica: elate globosa, subcastanea, fasciis nigro-fuscis: diam. 35, alt. 38 (ex icone) millim.

Helix humboldtiana, Férussac, Hist. Nat. Moll. Terr. t. 17 A. figg. 16, 17 [1]; Deshayes, ibid. i. p. 273 (1850–51) [2].

Hab. Mexico [1 2]: nearer locality not indicated.

b. *hegewischi*: globosa, minor; pallida, strigis albis, fasciis distinctis: diam. 26–28, alt. 24–26 millim.

Helix humboldtiana (Valenciennes), Pfr. Symb. Hist. Helic. i. p. 37 (1841) [3]; in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, *Helix*, ii. p. 152. no. 590, t. 92. fig. 18 [4]; Monogr. Helic. Vivent. i. p. 196 [5]; Philippi, Abbild. neuer Conch. ii. p. 3 (29), t. 6. fig. 7 [6]; Reeve, Conch. Icon. vii., *Helix*, t. 102. fig. 566 [7].

Helix (*Pomatia*) *humboldtiana* (Val.), Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 240, t. 11. figg. 1, 1 *a* [8].

Pomatia humboldtiana (Val.), Binney, Bull. Mus. Comp. Zoöl. Harv. Coll. v. p. 336, t. 2. figg. J, K (anatomy) (1879) [9].

Hab. N. Mexico: Ciudad in Durango (*Forrer*).

Central Mexico: Desierto, Venta de Guajimilpan, route Mexico to Toluca (*Hegewisch* [3–6]); interior of Mexico [7].

c. *högeana*: depresso-globosa, sublævis, pallide rufescens, strigis albis, fasciis distinctis, subinterruptis: diam. 27–33, alt. 22½–28 millim. (Figg. 20, 21.)

Helix humboldtiana (part.), Pfr. in Martini & Chemnitz, loc. cit. t. 92. fig. 19 [10].

Hab. North Mexico: Chihuahua (*Höge*).

d. *buffoniana*: dilatato-globosa, major, subcastanea, fasciis minus distinctis, strigis flavo-albidis, plicis validioribus: diam. 41–45, alt. 38–39 millim.

Helix buffoniana, Pfr. in Zeitschr. für Malak. 1845, p. 152 [11]; Philippi, Abbild. neuer Conch. ii. p. 183, t. 9. fig. 2 [12]; Pfr. in Martini & Chemnitz, loc. cit. p. 151. no. 589, t. 92. figg. 11–13 [13], and Monogr. Helic. Vivent. i. p. 196 [14]; Reeve, Conch. Icon. vii., *Helix*, t. 102. fig. 565 [15].

Helix humboldtiana, var. *β. buffoniana*, Pfr. Monogr. Helic. Vivent. iii. p. 182 [16]; v. Mart. in Malak. Blätt. xii. p. 16 (1865) [17].

Helix (*Pomatia*) *humboldtiana*, var. *β. buffoniana*, Fisch. & Crosse, loc. cit. p. 240, t. 11. fig. 2 [18].

Arionta humboldtiana, var. *β. buffoniana*, Strebel, Beitr. Mex. Land- und Süssw.-Conch. iv. p. 35 [19].

Helix matronula, Uhde, in litt. [20].

Hab. Central Mexico: Rio Frio [11–14], route Mexico to Puebla [19] (*coll. Gruner*); environs of the city of Mexico (*Boucard* [18]); Mexico, without nearer indication of locality (probably near the city) (*Uhde* [17]).

e. *badiocincta*: conoideo-dilatata, major, sublævis, pallide brunnea, fasciis latioribus perdistinctis: diam. 40, alt. 36 millim. (Figg. 22, 22 *a*.)

Helix badiocincta, Wiegmann, in litt. (Mus. Berol. circa 1837) [21].

Helix aspersa, Binney, Terr. air-breath. Moll. N. Am. iii. t. 43 (nec Müll.) [22].

Helix humboldtiana, var. *a*, v. Mart. in Malak. Blätt. xii. p. 16 (1865) (part.) [23].

Arionta humboldtiana (Val.), Tryon, Am. Journ. Conch. ii. pp. 318, 327, t. 23 (6). fig. 17 [24].

Hab. Mexico: without nearer indication of locality (probably near the city of Mexico) (*Deppe* [21 23]).

This species has the general appearance of the subgenus *Pomatia*, and the var. *buffoniana* bears a remarkable resemblance at first sight to *H. subplicata*, Lowe, from Porto Santo, or *H. mazullii*, Jan, from Sicily; but in both these the umbilicus is quite closed by the columellar margin. *H. humboldtiana* differs, however, from all known species of *Pomatia* by the granulation of the surface of the shell, a character bringing it rather near to *H. eximia*, as Fischer and Crosse have already stated. This granulation is most distinct in the var. *buffoniana*, rather obsolete, but still perceptible, in var. *högeana*, intermediate in *badiocincta* and *hegewischi*; it is not confined to the cuticula (epidermis), but is also visible in the calcareous shell beneath the cuticula. The varieties which are here enumerated have, at first sight, a very different aspect, but they are connected by intermediate gradations: thus, there is a specimen from Chihuahua quite intermediate between var. *högeana* and var. *badiocincta* (diam. maj. 36,

alt. 32 millim.; pale reddish, with small bands, granulation obsolete); one from Durango belongs to *högeana* rather than to *hegewischi*, &c.

The locality "Alameda county, California," for *H. buffoniana*, is expressedly stated to be incorrect—*cf.* Binney, Terr. air-breath. Moll. N. Am. v. p. 381, and Manual of Am. Land-Shells, p. 471.

The type is known to me only from Férussac's figure. The umbilicus is, in all specimens I have seen, nearly, but not entirely, covered by the columellar margin.

The bands are nearly always three in number, more or less distinct, the middle one falling into the suture at some distance behind the aperture, and thus corresponding to the third band of *H. pomatia*, *H. nemoralis*, *H. eximia*, *H. ghiesbreghti*, &c. The lower one corresponds to the fourth band of *H. pomatia* and *H. aspersa*, the suture being bent down to, and even to a little below, it at the aperture, as in *H. aspersa*. The upper one corresponds to the second band of *H. pomatia*, *H. aspersa*, and *H. nemoralis*. The breadth of the single bands is somewhat variable, the middle one being in some specimens broader, in others narrower, than the two others. The lower one is very indistinct in some specimens of var. *buffoniana*. Only in one specimen (of var. *högeana*) are the three bands near the aperture much enlarged and united into one dark mass.

21. **Helix eximia.**

Helix eximia, Pfr. in Philippi's Abbild. neuer Conch. i. p. 153, t. 5. fig. 6 (1844)[1]; P. Z. S. 1845, p. 41[2]; in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, *Helix*, i. p. 336. no. 336, t. 60. figg. 23, 24[3]; Monogr. Helic. Vivent. i. p. 329[4]; Reeve, Conch. Icon. vii., *Helix*, t. 97. fig. 529[5]; Tristram, P. Z. S. 1861, p. 230[6]; Crosse & Fisch. in Journ. de Conch. xxi. p. 276 (1873)[7]; v. Mart. in P. Z. S. 1875, p. 648[8]; Stoll, Guatem. Reisen und Schild. aus den Jahr. 1878–83, p. 198[9].

Helix (*Odontura*) *eximia* (Pfr.), Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 242, t. 11. figg. 3, 3 *a–d* (living anim.), pp. 206–210, t. 13. figg. 7–12 (anatomy, radula, jaw)[10].

Odontura eximia (Pfr.), Strebel, Beitr. Mex. Land- und Süssw.-Conch. iv. p. 36[11].

Hab. N. Guatemala: Coban (*Morelet*[10], *Salvin*[8 10], *Sarg*[11], *Conradt*); mountains of Vera Paz, especially in the environs of Coban (*Bocourt*[10]); Alta Vera Paz (*Stoll*[9]); Guatemala (*Salvin*[6]).

W. Guatemala: oak-forests, in Upper Cholhuitz[9] and near San Martin, about 6000 feet above the sea; it extends on the western slope of the Cordillera higher up than *H. ghiesbreghti*, its lower limit about coinciding with the upper limit of that species (*Stoll*, *in litt.*).

Var. *stolli*: depressior, umbilico paullo latiore, fulva, fasciis fuscis, granulis distincte piliferis: diam. maj. 41, min. 31, alt. 28, apert. diam. 24, alt. obl. 21 millim.

Hab. N. Guatemala: Vera Paz (*Stoll*).

Somewhat variable in size and in the number of the bands; generally there are

three on the upper face, the middle one the largest, and two on the lower surface of the last whorl, the upper one of which is larger than the others; this agrees with the normal number of five bands in *H. nemoralis*, *H. hortensis*, &c. In the six-banded specimen, mentioned by Fischer and Crosse as var. β, and figured by them (figg. 3 *b*, *c*), the fourth band seems to be divided into two. One specimen collected by Salvin is 0, 2, 3, 4, 4, 5, the lower ones very faint. Morelet has also found specimens without any band [7].

The rose colour of the aperture in fresh specimens fades sooner or later in preserved shells.

The living animal is described and figured by Fischer and Crosse [10], from notes supplied by Morelet and Bocourt; the latter states that it is called "tsibsib" by the natives of Vera Paz.

Crosse and Fischer [7] mention a specimen of 54 millim. in diameter; the largest I have seen measures 44 millim.

Pfeiffer [1–4], on the authority of H. Cuming, gives for this species and *H. trigonostoma*, the locality "Vera Cruz, province of Honduras"; but, as Fischer and Crosse remark [10], "Vera Paz" is probably intended.

The var. *stolli* somewhat approaches *H. ghiesbreghti* by the above-stated characters; but in its whole aspect, size, and especially in the more vertical position of the aperture, it belongs to *H. eximia*. Perhaps it may be a hybrid between the two species, as only one specimen has been found by Dr. O. Stoll.

[*Note*.—Species incerta. Tate, Am. Journ. Conch. p. 156 (1870), mentions a species of *Helix*, "as large as *H. pomatia*," found at Acota in Nicaragua by Blake. This may, perhaps, belong to an undescribed species of this subdivision.]

22. **Helix ghiesbreghti.** (Tab. VIII. figg. 1, 1 *a–d*, 2, 3, 3 *a*, 4.)

a. typica: basi fusca, fasciis omnibus fuscis, superis 2 sæpius confluentibus, pilis pallidis: diam. 53–75 millim. (Figg. 3, 3 *a*, 4.)

Helix ghiesbreghti, Nyst, in Bull. Acad. Bruxell. viii. 1, p. 343, fig. 2 (1841) [1]; Pfr. Monogr. Helic. Vivent. i. p. 328 [2]; in Martini and Chemnitz, Syst. Conch.-Cab. ed. 2, *Helix*, i. p. 319. no. 317, t. 56. figg. 1, 2 [3]; Deshayes, in Férussac's Hist. Nat. Moll. Terr. et Fluv. i. p. 167 [4]; Reeve, Conch. Icon. vii., *Helix*, t. 97. fig. 535 [5]; Albers, Die Helic. (ed. 1) p. 107 (subgen. *Aglaia*) [6]; Tristram, P. Z. S. 1861, p. 230 [7]; v. Mart. P. Z. S. 1875, p. 648 [8]; Stoll, Guatem. Reisen und Schild. aus den Jahr. 1878–83, p. 198 [9].

Helix (*Odontura*) *ghiesbreghti* (Nyst), Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 245, t. 10. fig. 9, pp. 206–210, t. 13. figg. 1–6 (anatomy, radula, jaw) [10].

Macrocyclis (*Lysinoë*) *ghiesbreghti* (Nyst), H. & A. Adams, Gen. Moll. ii. p. 203 (1858) [11].

Odontura ghiesbreghti (Nyst), Strebel, Beitr. Mex. Land- und Süssw.-Conch. iv. p. 37 [12].

Hab. S. Mexico: Chiapas (*Ghiesbreght* [1–5]).

N. Guatemala: Coban (*Salvin* [8], *Morelet* [10], *Bocourt* [10], *Sarg* [12]); Purula, towards the head of the Polochic valley (*Champion*).

W. Guatemala: Cerro Zunil, on the Pacific slope, near Quezaltenango (*Champion*); Hacienda Buenavista in Upper Cholhuitz, 4000 to 5000 feet above the sea, in forests (*Stoll* [10]).

Salvador (*Morelet* [8]).

b. *subaurantia*: fasciis 2 superioribus et facie infera tota aurantiis, fasciis 2 intermediis fuscis, pilis griseis: diam. 70 millim. (Figg. 1, 1 *a–d*.)

Helix ghiesbreghti, Deshayes, in Férussac's Hist. Nat. Moll. Terr. et Fluv. t. 94. figg. 9–12 [13].

Hab. N. Guatemala: Purula (*Champion*).

W. Guatemala: Cerro Zunil (*Champion*).

At both localities in company with typically coloured examples.

c. *strubelli*: aurantio-lutea, fasciis 2 superis subobsoletis rufescentibus; fascia peripherica et infera fuscis, pilis nigris: diam. 77 millim. (Fig. 2.)

Helix strubelli, Böttger, in Nachrichtsblatt d. deutsch. Malak. Ges. 1889, p. 164 [14].

Hab. Mosquito coast: North of Cape Gracias-à-Dios [14].

Dr. O. Böttger has been kind enough to allow me to examine and figure his type-specimen of this variety.

d. *fulvo-straminea*: supra et infra fulvo-straminea, fasciis 3 fuscis.

Helix ghiesbreghti, var. γ, Fisch. & Crosse, loc. cit. p. 245, t. 10. fig. 9 *a* (living animal) [15].

Hab. Central Guatemala: Toliman, in the hills above San Lucas, near the lake of Atitlan, department of Solola, temperate zone (*Bocourt* [15]).

e. *bizonata*: subobtecte umbilicata, lutescens, fasciis 2 fuscis, supera angusta, infera latiore.

Helix ghiesbreghti, var. δ, Fisch. & Crosse, loc. cit. pp. 245, 247 [16].

Hab. Honduras: Cordillera of San Marcos, about 2660 metres above the sea (*A. Sallé* [16]).

The two bands correspond very probably to the third and fourth of the type; the colour of the hairs is not indicated.

f. *rufo-zonata*: "fulva, superne rufo-zonata": diam. 57 millim.

Helix ghiesbreghti, var. β, Pfr. Monogr. Helic. Vivent. i. p. 329 [17]; Fisch. & Crosse, loc. cit. p. 247 [18].

Hab. ——? Locality not indicated [17] [18].

Dr. O. Stoll has furnished me with a description of the living *Helix ghiesbreghti*, which we may insert here for comparison with that given by Fischer and Crosse:—

"Length of the animal 14 centimetres, breadth 5·5; upper feelers 3·1, lower 1 centim. Surface coarsely wrinkled and warty, much more so than in *H. pomatia* of

Europe; sides broad, hinder end somewhat tapering. Length of the crest on the back of the foot behind the shell 2·3 centim. Feelers and face blackish; back blackish-grey, with a broad ochre-yellow line in the centre; sides yellowish-grey; crest white; lateral edges and hinder end brownish-grey; the furrows between the warts deep brown. Sole greyish-white, white-dotted, with broad, somewhat darker lateral edges. Collar greyish-brown; stalk of the trunk within the aperture milk-white. Face higher than broad, convex, steeply sloping. The crest on the back of the foot can be withdrawn so deeply, that it leaves a furrow instead of the prominence. If the animal is irritated, it jerks the shell from one side to the other in regular movements. It lives in lofty forests, and gradually becomes rarer near the settlements by the burning of the forests. In former times it was used as Lenten-food by the Indians of the department of Vera Paz, as also the *Melaniæ*."

Several of the above-named varieties may be scarcely more than individual variations: the whole underside is sometimes of the same dark brown colour as the lower band, or may be of an intermediate reddish-brown, sometimes very bright, or of the same pale fawn colour as the rest of the shell between the bands; the bands are dark brown, but some or all of them are occasionally paler, more reddish, or even quite obsolete. But these differences of colour are very striking, more especially in the var. *strubelli*; the var. *rufo-zonata* seems to be also geographically limited.

The colour of the hairs, where they are preserved in the dry shells from Cerro Zunil, is a pale grey; in the var. *strubelli* they are black.

The size of adult specimens varies from 63–77 millim. in diameter, rather independently of the coloration; the elevation of the spire is also somewhat variable in comparison to the diameter. I have before me two specimens of 69 and of 75 millim. in diameter, both equally 52 millim. in height.

Subgen. Oxychona, Mörch.

Oxychona, Mörch, Cat. Conch. Yoldi, i. p. 14 (1852) (type *Helix bifasciata*, Burrow).
Geotrochus (b. Species brasilienses), v. Martens, in Albers's Die Helic. ed. 2, p. 168.
Geotrochus and *Corasia*, Fischer & Crosse, Miss. Scient. Mex., Mollusca, i. pp. 291, 296.

Shell smooth and shining, whitish, with various dark spiral bands and sometimes dark spots, angulated or even keeled, more or less conical above, flat below; margins of the aperture rather thick and conspicuously expanded and reflexed. Back of the foot with a knobbed keel as in *Odontura* (at least in *H. trigonostoma*).

Although the anatomy is not yet known, I feel convinced that *Helix trigonostoma*, *H. bicincta*, *H. guillarmodi*, *H. costaricensis*, and *H. adela* form a natural group of Neotropical *Helices*, agreeing chiefly in the bright-coloured, shining, and nearly smooth surface of the shell, the angularity of the whorls, and the reflexed margins of the aperture. The differences between them consist chiefly in the degree of the angularity of

Comparative Table of the Species of the Subgenus *Oxychona*.

Nomen.	Forma.	Umbilicus.	Sculptura.	Coloratio.	Apertura.	Diam.	Alt.	Apert.	Anfr.	Patria.
trigonostoma, *Pfr.*	late trochiformis, subangulata.	obtectus.	striatula, obsolete spiratim striata.	albida vel flavida, fasciis fuscis, basi latioribus.	modice obliqua, subtriangularis, expansa, alba.	mm. 25 | 30	mm. 18 | 24	mm. 13 | 14½	4½	N. Guatemala, ? Honduras.
——, var. elevato-conica, *Fisch. & Cr.*	elevato-trochiformis, non angulata.	,,	,,	,,	,,	22 | 27½	21 | 26	12½ | 16½	4½	N. & Central Guatemala.
——, var. sallæana, *Pfr.*...	globoso-trochiformis, non angulata.	,,	,,	pallide flavescens, fasciis virescentibus.	,,	27 | 30	21½ | 28	18	4½	E. & S. Guatemala.
——, var. intermedia, *Fisch. & Cr.*	trochiformis, subangulata.	,,	,,	flavescens, supra fasciis obsoletis et guttulis raris, infra fusco-fasciata.	,,	26 | 28	22 | 24	13 | 15½	4½	N. & S. Guatemala.
——, var.stolliana, *v.Mart.*	late trochiformis, subangulata.	fere plane obtectus.	,,	flavescens, supra guttulata, infra fusco-fasciata.	,,	26 | 38	21 | 27	16 | 21	4½	S. & W. Guatemala.
——, var. freytagiana, *Dohrn.*	trochiformis, obtuse angulata.	obtecte perforatus.	leviter costulato-striata, spiratim sulculosa.	fuscescens, guttulis raris fuscis, fasciis obsoletis.	paullum obliqua, rhombea, reflexa, alba.	30 | 38	22 | 24	14 | 16	4½	Honduras.
altispira, *Dohrn*	elevate trochiformis, non cingulata.	imperforatus.	leviter striatula.	griseo-fusca, inferne castanea, fasciis flavis.	modice obliqua, reflexa, nigricans.	21	24	12	5½	Honduras.
zhorquinensis, *Angas*	trochiformis, acute carinata.	plane obtectus.	subtilissime granulosa.	pallide virescens, fascia 1 fusca.	subhorizontalis, acuminata, reflexa, alba.	28	21	?	6	Costa Rica.
bicincta, *Pfr.*	conoideo-globosa.	plus minusve obtecte perforatus.	subtilissime spiratim striata, nitida.	flavescens vel grisea, fascia 1 fusca, zona suturali et peripherica opace albis.	paullum obliqua, breviter reflexa, alba.	15 | 19	10 | 13	8	4½	S.W. & E. Mexico.
adela, *Angas*.....	depressa, non angulata.	apertus.	sublævis, nitidula.	albida, fascia unica fusca.	valde obliqua, oblonga, expansa, alba.	26	9	11½	4½	Costa Rica.
costaricensis, *Roth*	sublenticularis, supra elatior, carinata.	,,	,,	rufescens, supra uni- vel bifasciata, infra alba.	valde obliqua, securiformis, expansa, alba.	24 | 28	13 | 15	14 | 15	4	Costa Rica.
guillarmodi, *Shuttl.*.....	lenticularis, carinata.	fere plane obtectus.	,,	isabellina, fasciis fuscis angustis, una supra, altera infra carinam.	valde obliqua, triangularis, expansa, alba.	27	13½	13	4	E. Mexico.

the shell, from very obtuse to sharply keeled, and in the more or less elevated spire. On this account they have been widely separated by previous authors, *H. bicincta* having been placed with *Arionta* or *Leptarionta* (Fischer), *H. trigonostoma* with the Papuan *Geotrochus*, and *H. guillarmodi* with the Philippine *Corasia*. But I hesitate to admit into one natural subgenus terrestrial species which are geographically so widely separated unless they are connected one with another by Palæarctic and Nearctic forms, giving them a cosmopolitan distribution, as is the case in *Patula*, *Succinea*, and *Hyalina*, or unless their real affinity is proved by anatomical investigation.

Perhaps also the Brazilian *H. bifasciata*, Burrow, and *H. lonchostoma*, Menke, may find their natural place in this subgenus, although they are somewhat peculiar in their general aspect. Anatomical investigation will confirm or disprove this proposition, suggested by the knowledge of the shells only.

23. **Helix trigonostoma.** (Tab. IX. figg. 1, 1 *a*–9, 9 *a*, 11, 12.)

a. typica: late trochiformis, subangulata, albida, fasciis fuscis, basi latioribus.

Helix trigonostoma, Pfr. in Philippi's Abbild. neuer Conch. i. p. 154, t. 4. fig. 8 (1844) [1]; P. Z. S. 1845, p. 41 [2]; Monogr. Helic. Vivent. i. p. 229 [3]; in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, *Helix*, i. p. 282. no. 282, t. 49. fig. 10 [4]; Reeve, Conch. Icon. vii., *Helix*, t. 105. fig. 584 [5].

Helix (*Geotrochus*) *trigonostoma* (Pfr.), Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 291, t. 11. fig. 6 [6].

Hab. N. Guatemala: forests of Peten (*Morelet* [6]); Senahu, north side of the Polochic valley above Panzos (*Champion*); Vera Paz (*Stoll*); "Prope Vera Cruz, in prov. Honduras, Am. Centr." (*Cuming*, *Pfeiffer* [2–5]), probably Vera Paz is intended.

Honduras: on the leaves of trees (*Delattre* [6]).

b. *elevato-conica*: elevato-trochiformis, non angulata, fasciis fuscis, basi latioribus.

Helix lalliana, Tristram, P. Z. S. 1861, p. 230 [7] (misprint for *salleana*).

Helix trigonostoma, var. γ. *elevato-conica*, Fisch. & Crosse, loc. cit. p. 291, t. 11. fig. 6 *a* [8].

Hab. N. Guatemala: mountains of the department of Vera Paz (*Bocourt* [8]); Coban (*Conradt*).

Central Guatemala: near the city of Guatemala, 5000 feet above the sea (*Stoll*).

c. *sallœana*: globoso-trochiformis, flavescens, fasciis virescentibus.

Helix salleana, Pfr. P. Z. S. 1849, p. 129 [9]; Monogr. Helic. Vivent. iii. p. 173 [10]; in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, *Helix*, ii. p. 281. no. 766, t. 124. figg. 17, 18 [11].

Helix trigonostoma, var. ε. *salleana*, Fisch. & Crosse, loc. cit. p. 291 [12].

Helix trigonostoma, var. η. *obscura*, Fisch. & Crosse, loc. cit. p. 291, t. 11. fig. 6 *d* [13].

Hab. E. Guatemala: Sierra del Mico, south of the Golfo Dolce (*Sallé* [12]); "in ripis fluvii San Juan, Guatemalæ" (*Sallé* [9–11]).

S. Guatemala: San Agustin (*Bocourt* [13]).

d. *intermedia*: trochiformis, subangulata, supra obsolete fasciata et rare guttulata, infra fusco-fasciata. (Figg. 1, 1 *a*.)

Helix trigonostoma, var. δ. *intermedia*, Fisch. & Crosse, loc. cit. p. 291, t. 11. fig. 6 *b* [14].

Hab. N. GUATEMALA: Senahu in Vera Paz (*Champion*).
S. GUATEMALA: San Agustin, very common (*Bocourt* [14]); Cerro Zunil (*Stoll*).

e. *stolliana*: late trochiformis, subangulata, fuscescens, supra guttulata, infra fusco-fasciata. (Figg. 2, 2 *a*–7, 7 *a*, 11, 12.)

Helix salleana (Pfr.), Reeve, Conch. Icon, vii., *Helix*, t. 102. fig. 564 [15].
Helix trigonostoma, var. *subunicolor*, Fisch. & Crosse, loc. cit. p. 292, t. 11. fig. 6 *c* [16].
Helix trigonostoma, Stoll, Guatem. Reisen und Schild. aus den Jahr. 1878–83, p. 198 [17].

Hab. S. & W. GUATEMALA: Cerro Zunil, Pacific slope, near Quezaltenango, common, and El Reposo between Retalhuleu and the Pacific (*Champion*); San Agustin, in woods (*Bocourt* [16]); the commonest species of *Helix* on the western slope of the Cordillera, between 2500 and 4500 feet above the sea, at Hacienda San Francisco, Miramar, and Helvetia, Buenavista, in woods (*Stoll* [17]).

f. *freytagiana* (*H. freytagiana*, Dohrn, in litt.): testa trochiformis, obtuse angulata, obtecte perforata, leviter costulato-striatula, distincte malleata, fuscescenti-fulva, guttulis raris fuscis picta, obsolete fasciata; anfr. $4\frac{1}{2}$, $1\frac{1}{2}$ primi læves, convexi, lætius fulvi, sequentes supra convexiusculi, ultimus basi subplanatus, antice vix deflexus. Apertura parum obliqua, rhombeo-triangularis, intus fusca; peristoma modice reflexum, album, retro fusco-cinctum, margine supero fere rectilineo, infero modice arcuato, ad insertionem dilatato, appresso, perforationem fere totam obtegente. (Figg. 8, 8 *a*, 9, 9 *a*.)

Diam. maj. mm.	Diam. min. mm.	Alt. mm.	Apert. diam. mm.	Alt. obliqua. mm.
31	25	$23\frac{1}{2}$	16	$14\frac{1}{2}$
30	24	22	17	14
38	32	27	19	$16\frac{1}{2}$

Hab. HONDURAS (*coll. Dohrn*).

Dr. O. Stoll, in his MS. notes, states that in this species the back of the foot is provided with a median crest of papillæ as in *H. eximia*, and even more conspicuously than in *H. ghiesbreghti*, although it is not shown in the figure of the living animal given by Fischer and Crosse, *op. cit.* t. 11. fig. 6 *b*.

This species is very variable, not only in form but in colour. We may distinguish the rather broadly conical forms with a distinct angle at the periphery *, such as the typical *trigonostoma* and the var. *stolliana*, and the higher, not angulated forms, as the varr. *elevato-conica* and *sallæana*; but they run almost insensibly one into the other. Fischer and Crosse's var. *luteo-albida* (their fig. 6) is an intermediate form between the type and var. *elevato-conica*. The variations in colour are apparently of somewhat more importance, as they agree with the geographical distribution—those

* In the figure in Martini and Chemnitz, ed. 2, t. 49. f. 10 [4], the drawing of the angle is perhaps too sharp; I have never seen a specimen with it so sharp, though I have before me shells of similar size and colour.

with very distinct bands on the upper side, without spots (type and var. *elevato-conica*), being confined to Northern Guatemala, and those with very indistinct bands above and many spots (varr. *stolliana* and *sallæana*) to Southern, Western, and Eastern Guatemala. But these differences also are not sharply defined, as is shown by the var. *intermedia* of Fischer and Crosse. On the upper side the bands are very variable—in number and in breadth; generally they are narrow, but some very narrow and one or two still narrower ones may be found in the same specimen (varr. *elevato-conica* and *intermedia*). In var. *stolliana* the upper bands are either united to one broad zone occupying nearly the whole upper half of the last whorl, except the sutural region, but somewhat indistinct, or they are quite absent; only in a few specimens one or more distinct bands are to be seen above. In the under half there are generally two rather broad bands, the outer one never absent, only varying in intensity in var. *stolliana*; the inner one either subequal to the other or much broader, extending to the centre of the base, rarely broken up into several very narrow bandlets.

As regards the locality given by Pfeiffer, see *H. eximia*, *anteà*, p. 150.

The var. *freytagiana* is rather near to the var. *stolliana*, but the peripheric angle is distinct, although obtuse, and the lower side flattened; the columellar margin of the aperture is therefore more straightly ascending and the general form of the aperture more rhombic. The somewhat deepened patches of the surface, as if caused by hammer-strokes, and the dark colour close behind the peristome, are also visible in many specimens of the var. *stolliana*. In some specimens of the var. *freytagiana* dark brown bands, variable in number and breadth, are to be seen more or less distinctly; but in others they are almost totally wanting.

Named in honour of Gustav Freytag, the well-known German author.

24. **Helix altispira,** sp. n. (Tab. IX. figg. 10, 10 *a*, *b*.)

Helix altispira, Dohrn, in litt.

Testa elevate trochiformis, imperforata, leviter striatula, superne griseo-fusca, guttulis nigris perraris, inferne rufo-fusca, fascia nigra una peripherica et fasciis flavis nonnullis picta; anfr. $5\frac{1}{2}$, primi 2 convexi, nigricantes, apicem obtusum formantes, sequentes convexiusculi, ultimus ad peripheriam rotundatus, basi convexiuscula. Apertura modice obliqua, subrhombea, intus cærulescens; peristoma modice reflexum, nigricanti-violaceum, marginibus leviter arcuatis, columellari valde ascendente, appresso.

Diam. maj. 21, min. 19, alt. $24\frac{1}{2}$; apert. diam. 12, alt. obl. 12 millim.

Hab. Honduras (*coll. H. Dohrn*).

In the only specimen I have seen of this species there is a narrow yellow band (reddish-brown at its commencement in the third whorl) visible on the upper side, at about an equal distance between the suture and the periphery; and the lower side is for the most part dark chestnut-brown, but yellow towards the periphery; and where these colours meet there are several very narrow bands, alternately yellow and chestnut.

H. altispira approaches the polymorphous *H. trigonostoma*, but considerably exceeds in height its var. *elevato-conica*, from which it also differs in colour.

25. **Helix zhorquinensis.**

Helix (*Oxychona*) *zhorquinensis*, Augas, P. Z. S. 1879, p. 475, t. 40. fig. 1 [1].

Hab. Costa Rica: along the Zhorquin river (*Gabb* [1]).

"Animal very slender, nearly white, pale brownish on head and top of body" (*Gabb*) [1].

This fine species, by its exact conical form, sharp keel, and the outward projection of the aperture, approaches very remarkably the well-known Brazilian *H. bifasciata*, Burrow, and *H. lonchostoma*, Menke. On the other hand, the "very slender" animal confirms its affinity with *H. trigonostoma*.

26. **Helix bicincta.**

Helix bicincta, Pfr. Symb. Hist. Helic. i. p. 38 [1]; in Philippi's Abbild. neuer Conch. i. p. 49, t. 3. fig. 5 [2]; Monogr. Helic. Vivent. i. p. 341 [3], and v. p. 352 [4]; in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, *Helix*, ii. p. 364. no. 894, t. 138. figg. 13, 14 [5]; v. Mart. in Malak. Blätt. xii. p. 17 (1865) [6].

Helix (*Leptarionta*) *bicincta* (Pfr.), Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 253, t. 10. fig. 7 [7].

Corasia bicincta (Pfr.), Strebel, Beitr. Mex. Land- und Süssw.-Conch. iv. p. 51, t. 13. fig. 17 (young shell) [8].

Hab. S.W. Mexico: State of Oaxaca (*Hegewisch* [1–5]); Oaxaca (*Uhde* [6]); Juquila and Panistlahuaca, in the same State (*Boucard* [4–7]).

E. Mexico: Soledad, between Cordova and Orizaba (*Höge*).

Variable in size and colour. The largest specimen I have seen, from Soledad, measures 19 millim. in diameter and 13 millim. in height; the smallest, full-grown, 15 and $10\frac{1}{2}$. The colour is dull greyish-chocolate above and below or pale brimstone-yellow on both sides, or the upper side pale greyish brown and the lower side whitish, or greyish-white above and below; the dark brown band in the periphery is wanting only in some whitish specimens; the opaque white or pale yellow sutural zone and the peripherical well-defined band of the same colour immediately beneath the dark one are always present; a dark brown or blackish transverse band close behind the white aperture is visible in all the specimens, white as well as brown ones. In adult examples the umbilicus is either nearly or quite closed by the large reflexed columellar margin of the aperture. *H. bicincta*, in well-preserved condition, is one of the handsomest species of the genus in Mexico.

27. **Helix adela.**

Helix adela, Angas, P. Z. S. 1878, p. 72, t. 5. figg. 8–10 [1].

Hab. Costa Rica : Navarro, on trees (*Boucard* [1]).

Chiefly distinct from the following by the whorls not being keeled.

28. **Helix costaricensis.**

Helix costaricensis, Roth, in Pfeiffer's Novitat. Conch. i. p. 78, t. 21. figg. 15–17 [1]; Pfr. Monogr. Helic. Vivent. iv. p. 302 [2].

Helicigona (*Planispira*?) *costaricensis* (Roth), Mörch, in Malak. Blätt. vi. p. 111 (1859) [3].

Helix boucardi, Angas, P. Z. S. 1878, p. 72, t. 5. figg. 5–7 [4]; P. Z. S. 1879, p. 476 [5].

Helix costaricensis, var. *steiniana,* and forma *virginea,* Ancey, Bull. Soc. Malac. Fr. vii. pp. 155, 156 (1890) [6].

Hab. Costa Rica (*Wagner,* 1853 [1 2]; *Örsted* [3]; *Carmiol and von Seebach, in mus. Berol.*); Navarro, on leaves of trees (*Boucard* [4]); high hills only, commonest in Cabecar (*Gabb* [5]).

"Animal dark grey above, foot white" (*Gabb*) [5]. One or two bands are visible on the upper side—one halfway between suture and keel and one immediately above the keel, corresponding to nos. 2 and 3 in *Helix nemoralis*; the upper one (no. 2) is very often, the other (no. 3) rarely, wanting; in one specimen both are combined into one large band —, $\overset{\frown}{2\,3}$ — —. The upper side is more or less strongly convex. The lower side has a slight excavation immediately below the blunt keel, this at first sight having the appearance of a band.

29. **Helix guillarmodi.**

Helix guillarmodi, Shuttl. in Bern Mittheil. 1852 (Diagn. no. 2, p. 19), p. 199 [1]; Pfr. in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, *Helix,* ii. p. 413. no. 966, t. 147. figg. 5–7 [2]; Monogr. Helic. Vivent. iii. p. 206 [3]; Reeve, Conch. Icon. vii., *Helix,* t. 104. fig. 576 [4].

Helix (*Corasia*) *guillarmodi* (Shuttl.), Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 296, t. 10. figg. 8, 8 *a* [5].

Axina guillarmodi (Shuttl.), H. & A. Adams, Gen. Moll. ii. p. 193 [6].

Corasia guillarmodi (Shuttl.), Strebel, Beitr. Mex. Land- und Süssw.-Conch. iv. p. 50 [7].

Hab. E. Mexico: Toxpam, near Cordova, on leaves of trees (*Sallé* [5], *Strebel* [7]); Cerro de Palmas, near Cordova (*Höge*); Vera Cruz (*Guillarmod* [1–4]).

In its depressed form, very sharp keel, and coloration, *H. guillarmodi* bears some resemblance to certain species from the Philippines which form the subgenus *Corasia*; nevertheless, I do not suppose that it is really allied to them, but, on the contrary, to such Central-American forms as *H. costaricensis*, *H. sallæana*, &c.

Ordinarily only two bands are present—one close above and one below the keel, corresponding to nos. 3 and 4 of *H. nemoralis*; but in some specimens an upper one, very narrow, near the suture, is also visible, and in others beyond this near the

aperture a trace of a second, corresponding to nos. 1 and 2 (see Martini & Chemnitz, *loc. cit.* fig. 6).

There is a curious resemblance between these shells (nos. 27, 28, 29) and some from the Moluccas, viz. *H. costaricensis* to *H. scheepmakeri*, Pfr., *H. guillarmodi* to *H. biconvexa*, v. Mart., and *H. adela* to *H. aurita*, v. Mart. (see Die Preuss. Exped. nach Ost-Asien, ii. Landschnecken, pp. 316–318, t. 16. figg. 12, 13); but I suppose this may be rather an analogy than a true affinity, and only the knowledge of the anatomy (jaw, radula, and genital organs) can decide the point.

Subgen. Solaropsis, Beck.

Solaropsis, Beck, Ind. Moll. p. 164 (1838); Albers, Die Helic. ed. 1, p. 127, ed. 2, p. 164.

Shell depressed, beneath more convex than above, finely granulated, variegated with reddish-brown, umbilicated or perforated; aperture nearer to the perpendicular than ordinarily in *Helix*, narrow lunate; peristome mostly reflexed, not very thick. Jaw nearly smooth.

This is a very characteristic subgenus of South America, where it is spread from Colombia to the southernmost provinces of Brazil; it has only one certain representative in Central America.

Comparative Table of the Species of the Subgenus *Solaropsis*.

Nomen.	Forma.	Umbilicus.	Sculptura.	Coloratio.	Aperturæ margo.	Diam.	Alt.	Anfr.	Patria.
tiloriensis, *Angas*	inflato - depressa, spira concaviuscula.	angustus, semiobtectus.	piloso-granulata.	fulva, fasciis et maculis rufis.	tenuis, subreflexus.	mm. 9	mm. 5	4⅓	S.E. Costa Rica.
sigmoides, *Morel.*	inflato - depressa, spira concava.	,,	,,	pallide flavescens, concolor.	tenuis, rectus.	13–19	7–9	3½–4	N. Guatemala.

30. **Helix tiloriensis.**

Helix (*Solaropsis*) *tiloriensis*, Angas, P. Z. S. 1879, p. 477, t. 40. fig. 2[1].

Hab. S.E. Costa Rica: hills between the rivers Tilorio and Zhorquin (*Gabb*[1]).

31. **Helix sigmoides.**

Helix sigmoides, Morelet, Test. Noviss. ii. p. 9 (1851)[1]; Pfr. Monogr. Helic. Vivent. iii. p. 73[2].
Helix (*Gonostoma*) *sigmoides*, Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 239, t. 12. figg. 6, 6 *a–d*[3]; Journ. de Conch. xxi. p. 275 (1873)[4].
Helix (*Odontura*) *sigmoides*, Strebel, Mex. Land- und Süssw.-Conch. iv. p. 38[5].
Helix vitrinoides, Tristram, P. Z. S. 1863, p. 411[6] (nec Deshayes).
Zonites vitrinoides, Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 170[7].

Hab. N. Guatemala: woods of the province of Vera Paz, in holes covered by dense bush, rare (*Morelet* [1–5], and in MS.); forests of Vera Paz (*Salvin* [6 7]).

Owing to the kindness of M. A. Morelet and of the Rev. H. B. Tristram I have been able to compare typical specimens of *Helix sigmoides* and *H. vitrinoides*, and find that they agree both in form and sculpture, the latter only a little more worn in *H. vitrinoides*. The sculpture appears, under a moderate magnifying-power, as if formed by small granules, disposed in quincunx, the more distinct rows of which are not parallel to the aperture, but descend from above and before to below and behind. Viewed under a stronger lens each granulum proves to be crowned by a little hole or dimple, in the midst of which a small eminence is situated; probably each is the scar of a hair. This sculpture extends in equal intensity on the lower side of the shell to the brim of the umbilicus.

The thin simple edge of the aperture and the small number of the whorls (Tristram[6] mentions $4\frac{1}{2}$—in his specimen I can see only $3\frac{1}{2}$) induced Strebel to suggest that *H. sigmoides* might be a young shell; but this is somewhat contradicted by the fact that the line of the suture is distinctly bent down near the aperture, as in full-grown shells: Morelet found several specimens of equal size at the same spot, and he is under the impression that they are full-grown. Fischer and Crosse[3] place it in the sub-genus *Gonostoma*, which contains European species with many narrow whorls. Strebel compares it with young specimens of *Helix ghiesbreghti*; but in this species the lower face of the shell is smooth. The sculpture much resembles that of *Solaropsis*, some smaller species of which have also a thin, nearly straight, edge of the aperture, and a flat or even concave spire. I place the species provisionally in *Solaropsis*.

Doubtful species of Helix.

The following species have been described by trustworthy authors as belonging to the Mexican or Central-American fauna; but they have not again been found by later collectors:—

Helix mexicana.

Helix mexicana, Fr. Koch, in Philippi's Abbild. neuer Conch. i. p. 23 (7), t. 2. fig. 5 (1843)[1]; Pfr. Symb. Hist. Helic. ii. p. 33[2]; Monogr. Helic. Vivent. i. p. 193[3]; in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, *Helix*, ii. p. 153. no. 591, t. 93. figg. 1, 2[4].
Helix (*Leptaxis*) *mexicana* (Fr. Koch), Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 238[5].

"Testa obtecte perforata, conico-globosa, tenuis, cornea, oblique regulariter striata; spira conica; anfr. 5, planiusculis, ultimo obsolete angulato; apertura transverse lunato-ovali; peristom. simplice, vix expanso, margine columellari reflexo, carneo.
"Diam. 5, altit. 4 lin." ($12\frac{1}{2}$ and 10 millim.).

Hab. MEXICO (*Hegewisch* [1–5]).

I have not been able to find an authentic specimen of *H. mexicana* in any German collection, nor to recognize the species in any Mexican shell I have seen. It is said to be near *H. indistincta*, Fér., from Haiti, a species of the subgenus *Plagioptycha*, but to differ from it by the more elevated spire; in the description the callous thickening, characteristic of *Plagioptycha*, is not mentioned.

Helix tenuicostata.

Helix tenuicostata, Dunker, in Philippi's Abbild. neuer Conch. ii. p. 6, t. 6. fig. 13 (1847) [1]; Pfr. Monogr. Helic. Vivent. i. p. 335 [2]; in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, *Helix*, ii. p. 224. no. 683, t. 109. figg. 14, 15 [3]; Reeve, Conch. Icon. vii., *Helix*, t. 178. fig. 1228 [4]; Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 298 [5].

"Testa perforata, depresso-globosa, solidula, oblique costulato-striata, alba, rufo-multifasciata; spira elevata, late conica; anfr. $4\frac{1}{2}$, convexiusculis, sensim accrescentibus, ultimo antice deflexo; apertura lunato-ovali; peristom. acuto, intus labiato, margine dextro subexpanso, columellari reflexo, adpresse dilatato, foramen fere tegente.
"Diam. $6\frac{1}{2}$, alt. 4 lin." ($16\frac{1}{4}$ and 10 millim.).

Hab. ? MEXICO.

This species is said to be near *H. gilva*, Fér., from Cuba, subgen. *Polymita*. It may perhaps be a variety of *H. berlandieriana* [2], only the description of the sculpture does not agree; judging from the published figures, I am inclined to identify it with *H. gilva*. *H. tenuicostata* is not represented in Dunker's collection, nor in the Museum of Berlin.

Species erroneously attributed to Mexico.

Helix indistincta.

Helix indistincta, var. β, Pfr. Monogr. Helic. Vivent. i. p. 194 [1]; in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, *Helix*, ii. p. 154 [2].

Hab. MEXICO (*David* [1 2]).

This is a Haitian species, and Pfeiffer himself states (Monogr. Helic. Vivent. iii. p. 150) that the variety β is also found in Haiti.

Helix mormonum.

Helix mormonum, Pfr. P. Z. S. 1857, p. 109 [1]; Monogr. Helic. Vivent. iv. p. 276 [2]; Binney, Terr. air-breath. Moll. N. Am. iv. p. 15, t. 79. fig. 21 [3]; Binney & Bland, Land and Fresh-water Shells of N. Am. i. p. 171, fig. 299 [4].

Helix (*Arionta*) *mormonum* (Pfr.), Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 251 [5].
Aglaia mormonum (Pfr.), Tryon, in Am. Journ. Conch. ii. p. 314, t. 22 (5). fig. 14 [6].
Arionta mormonum (Pfr.), Binney, Terr. air-breath. Moll. N. Am. v. (Bull. Mus. Comp. Zoöl. Harv. Coll. iv.) p. 366, fig. 248 [7]; Manual of Am. Land-Shells, p. 140, fig. 120 [8].

Hab. North America: Mormon Island, California [1–4]; California [6], San Joaquin Valley, north to Mt. Shasta [4 7]; Fresno County to Klamath Lake [7 8]; between the Sierra Nevada and the Coast Range [8].

This species has been erroneously ascribed to Mexico, by confounding Sonora in Tuolumne county, California, with the State of Sonora in Mexico [8].

Helix stolephora.

Helix (*Helicella*) *buphthalmus*, Férussac, Tabl. Syst. Moll. p. 42. no. 238 [1].
Helix stolephora, Valenciennes, in Humboldt & Bonpland's Obs. Zool. ii. p. 242, t. 56. figg. 4 *a*, *b* [2]; Pfr. Monogr. Helic. Vivent. i. p. 52 [3]; in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, *Helix*, i. p. 196, t. 32. figg. 1, 2 [4].

Hab. New Spain [1–4].

A well-known species of *Nanina*, ascribed wrongly to Mexico by Valenciennes [2]. Beck, Ind. Moll. 1838, p. 46, states correctly that it belongs to the Philippines.

POLYGYRA.

Polygyra, Say, in Journ. Acad. Phil. i. 2, p. 277 (1817); v. Martens, in Albers's Die Helic. ed. 2, p. 95; Pilsbry, Proc. Acad. Phil. 1889, p. 193, and 1891, p. 313.
Dædalochila and *Polygyra*, Beck, Index Moll. p. 21 (1838).

Aperture of the shell straightened by a conspicuous shelly prominence on the wall of the penultimate whorl (parietal fold), and by one or more thickenings (teeth) on the external and basal margin; immediately behind the aperture the last whorl is distinctly constricted in its lower part. Whorls narrow, gradually increasing, rather numerous ($5\frac{1}{2}$ or more). Coloration uniform, brownish, in worn specimens white. Sculpture consisting of prominent rib-like striæ, which are parallel to the aperture, more distinct on the upper side, and generally increasing in strength near the aperture. Umbilicus present, in some species widely open, in others more or less filled up by the prominent lower part of the penultimate whorl, which conceals all others (umbilicus obstructus). Average size 8–12 millim. in diameter. Shell generally depressed.

Jaw with stout vertical ribs. Genital organs very simple, without dart-sac, flagellum, or other appendages. [See Binney, Notes on Am. Land-Shells, ii. 2, p. 28, t. 5. figg. 3 and 6, *P. troostiana* (1874).]

The head-quarters of this genus are the Southern States of North America and the northern parts of Mexico; the northernmost locality known hitherto is Kentucky R., opposite Cincinnati (*P. dorfeuilleana*, Lea). Southwards it does not reach the continent

Comparative Table of the Species of *Polygyra*.

Nomen.	Umbilicus.	Plica parietalis.	Dentes marginis externi et basalis.	Spira.	Diam.	Alt.	Patria.
implicata, *Beck*	latus, pervius.	flexuose bicruris.	2 subæquales, compressi.	subplana.	mm. 8	mm. 3½	E. & S. Centr. Mexico.
oppilata, *Morel.*	,,	,,	1 ext. triangularis; 1 basalis simplex.	vix elevata.	7–8	3	E. Mexico?, S.W. Mexico, Yucatan.
dysoni, *Pfr.*	latiusculus, pervius.	simplex, valida.	2 subæquales, obtusi.	parum elevata.	9	4¾	Honduras.
chiapensis, *Pfr.*	parvus, pervius.	simplex, parvula.	1 ext. descendens; 1 basalis obsoletus.	breviter conoidea.	10½	6	Chiapas.
mooreana, *Binn.*	latus, anfr. penult. prominulo.	flexuose bicruris.	2 subæquales, obtusi.	sat convexa.	7–8½	5	Texas, N. & ? Centr. Mexico.
——, var. tholus, *Binn.* ...	,,	quadrato-bicruris.	,,	,,	10–11	6	Texas, ? E. Mexico.
yucatanea, *Morel*.....	latiusculus, pervius.	sub-bicruris.	2 simplices, ext. major.	subplana.	8½–10	4–5	Tabasco, Yucatan.
——, var. helictomphala, *Pfr.*	,,	,,	2 subæquales, obtusi.	vix elevata.	10–12	4–5⅓	Tabasco, Chiapas.
plagioglossa, *Pfr*.....	angustus, pervius.	simplex, parva.	1 ext. sursum elongatus; 1 basalis obtusus.	,,	9	4½	Centr. & S. Centr. Mexico.
dissecta, *v. Mart.*	,,	simplex, mediocris.	2 ext. lamellares, approximati; 1 basalis parvus.	breviter conoidea.	9	5½	Centr. Mexico.
couloni, *Shuttl*.....	,,	simplex, parva.	2 subæquales, obtusi.	sat convexa, testa subglobosa.	10–12	5–7	E., Centr., & S.W. Mexico.
bicruris, *Pfr.*	latiusculus, subobstructus.	bicruris, elongata.	1 ext. sursum valde elongatus; 1 basalis compressus, obliquus.	vix elevata, testa depressa.	8–10	4–4½	N.W. Mexico, ? Chiapas.
richardsoni, *v. Mart.*	punctiformis, obstructus.	inæqualiter bicruris.	1 ext. sursum valde elongatus; 1 basalis subcompressus, verticalis.	parum elevata.	9–11	4–5	N.W. Mexico.
ventrosula, *Pfr.*	angustus, pervius.	leviter bicruris.	2 ext., superior elongatus; 2 basales.	parum elevata, testa subglobosa.	13	7½	Texas, N.W. Mexico.
——, var. hindsi, *Pfr.* ...	,,	,,	,,	,,	8	4½	Texas, ? Mexico.
texasiana, *Moric.*	latiusculus, semiobstructus.	bicruris.	2 subæquales.	subplana.	9–11	5–5½	Texas, N.E. & ? E. Mexico.
behri, *Gabb*.....	,,	flexuose bicruris.	2, basalis major.	plana.	15	4½	N.W. Mexico.
ariadnæ, *Pfr.*	rimæformis, obstructus.	quadrato-bicruris.	2 subæquales, subhorizontales, compressi.	subplana.	9–11	4	Texas, N.E. & ? E. Mexico.
acutedentata, *Binn*.....	latiusculus, semiobstructus.	,,	2 ext., sup. lamellaris intrans, inferior *unciformis*; basalis 1 compressus.	,,	14	4	N.W. Mexico.
——, var. loisa, *Binn*.....	,,	,,	2 ext., sup. lamellaris intrans, inferior *unciformis*; basales 2 distincti.	,,	13	5	N.W. Mexico.
anilis, *Gabb*.....	,,	simplex, parva.	ext. nullus; basalis humilis, obtusus.	paullulum elevata.	13	6	N.W. Mexico.

of South America, and the species are less numerous on the Caribbean Islands than in Florida and Texas. Within our limits the southernmost is *P. dysoni*, in Honduras. In N.W. Mexico there are some species of comparatively large size and peculiar modification of the apertural teeth, for instance, *P. acutedentata*. Two other modifications found in the Southern States of North America are not yet known from Mexico, viz., the very flat and multispiral species, such as *P. cereolus*, Meg., and *P. septemvolva*, Say, in Florida, and those in which the upper external tooth of the aperture is situated somewhat deeper inward, as if pushed back by the prominent tips of the strong parietal fold, such as *P. troostiana* and *P. dorfeuilleana*, Lea, *P. fastigans*, Say, and *P. hazardi*, Bland, which are the characteristic forms in Tennessee and the adjacent regions.

1. **Polygyra implicata.** (Tab. VII. figg. 5, 5 *a–c*.)

Helix (*Dædalochila*) *implicata*, Beck, Index Moll. 1838, p. 21 (sine descr.) [1].

Helix implicata (Beck), v. Mart. in Malak. Blätt. xii. p. 20 (1865) [2]; Pfr. Monogr. Helic. Vivent. v. p. 421 [3].

Helix (*Polygyra*) *implicata* (Beck), Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 283, t. 12. figg. 12, 12 *a–c* [4].

Polygyra implicata (Beck), Strebel, Beitr. Mex. Land- und Süssw.-Conch. iv. p. 47, t. 3. figg. 1 *a–h* (* a young shell), p. 48 (anatomy) [5].

Helix oppilata, Pfr. Monogr. Helic. Vivent. iv. p. 314 [6]; Binney & Bland, Land and Fresh-water Shells of N. Am. i. p. 101, fig. 177 (ex parte, nec Morelet) [7].

Hab. E. Mexico: Rio Tecoluta, in the State of Vera Cruz, about 21° North Lat., near the shore (*Deppe* [2 4]); Agua Caliente, Rancho Guerrero, an island in the Rio Palpoala, Camino de Arroyo Hondo, and Camino de Obispo, all near Misantla (*Salas* [5]); Barranca de Mahuistlan, between Jalapa and Mirador, and San Juan Miahuatlan, at the roots of trees under rotten leaves (*Strebel* [5]); Jalapa (*Höge*); Vera Cruz, dead shells only, in alluvial deposits (*Uhde* [2 4], *Friedel* [2 4], and *Strebel* [5]); Mexico, without nearer indication of locality [1].

South Central Mexico: Oaxaca (*Höge*).

The specific name signifies "inwardly-folded," not, as one might suppose, "not folded," and refers to the aperture. The very open umbilicus and the two nearly equal external teeth are the chief characteristics of this species.

2. **Polygyra oppilata.**

Helix oppilata, Morelet, Test. Noviss. i. p. 8 (1849) [1]; Pfr. Monogr. Helic. Vivent. iii. p. 264 [2].

Helix (*Polygyra*) *oppilata* (Morel.), Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 285, t. 12. figg. 11, 11 *a–c* [3].

Polygyra oppilata (Morel.), Strebel, Beitr. Mex. Land- und Süssw.-Conch. iv. p. 49, t. 3. figg. 2 *a–d* [4].

Hab. E. Mexico: Vera Cruz, only in alluvial deposits (*Strebel* [4]).

S.W. Mexico: Isthmus of Tehuantepec (*Sallé* [3]).
Yucatan: on the shore (*Morelet* [1 2 3]).

Distinct from *P. implicata* by the upper external tooth being waved or folded ("complicatus"). The specific name signifies "stopped" or "locked up."

3. **Polygyra dysoni.**

Helix dorfeuilleana, Pfr. Monogr. Helic. Vivent. i. p. 410 [1]; in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, *Helix*, i. p. 377. no. 391, t. 65. figg. 25–28 [2]; ? Reeve, Conch. Icon. vii., *Helix*, t. 120. fig. 713 (not good [3]) (nec Lea).

Helix dysoni, Shuttl. in Bern Mittheil. 1852 (Diagn. no. 2, p. 16), p. 196 [4]; Pfr. Monogr. Helic. Vivent. iv. p. 315 [5].

Hab. Honduras (*Dyson* [1–5]).

Parietal fold simple, as in *P. plagioglossa*; umbilicus widely open, and external teeth simple, as in *P. implicata*.

4. **Polygyra chiapensis.**

Helix chiapensis, Pfr. P. Z. S. 1856, p. 377 [1]; Malak. Blätt. 1856, p. 230 [2]; Monogr. Helic. Vivent. iv. p. 315 [3].

Helix (*Polygyra*) *chiapensis* (Pfr.), Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 281 [4].

Hab. Chiapas (*Ghiesbreght* [1–4]).

According to the description [1], this species agrees with *P. dysoni* and *P. plagioglossa* by the simple, not two-branched, parietal fold; but the spire seems to be more elevated ("breviter conoidea"), the umbilicus smaller, though open ("pervius"), and the basal tooth very faint ("basali denticulo obsoleto").

5. **Polygyra mooreana.**

Helix (*Polygyra*) *mooreana*, Binney, Proc. Acad. Phil. ix. p. 184 (1857) [1]; Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 275 [2].

Helix mooreana, Binney, Terr. air-breath. Moll. of N. Am. iv. p. 80, t. 78. fig. 24 [3]; Pfr. Monogr. Helic. Vivent. iv. p. 352 [4]; Binney & Bland, Land and Fresh-water Shells of N. Am. i. p. 95, fig. 170 [5].

Dædalochila mooreana (Binn.), Tryon, Am. Journ. Conch. iii. pp. 64, 78, t. 3 (10). fig. 8 (1867) [6].

Polygyra mooreana, Binney, Terr. air-breath. Moll. of N. Am. v. (Bull. Mus. Comp. Zoöl. Harv. Coll. iv.) p. 271, fig. 170, and t. 6. fig. Q (radula) [7]; Manual of Am. Land-Shells, pp. 360 (jaw), 370, fig. 405 [8].

Helix texasiana, var. *minor*, in some collections.

Hab. North America: Washington County [1–5 8], Bosque County [7 8], Texas; Texas (*F. Römer*).

N. Mexico: North Mexican States adjoining Texas [2 5 7 8].

? Central Mexico: Leon (*Lieut. Blake* [2]).

Var. *tholus*: major, umbilico latiore.

Helix (*Polygyra*) *tholus*, Binney, Proc. Acad. Phil. ix. p. 186 (1857) [9].
Helix tholus, Binney, Terr. air-breath. Moll. N. Am. iv. p. 81, t. 78. fig. 21 [10]; Binney & Bland, loc. cit. p. 95, fig. 171 [11]; Pfr. Monogr. Helic. Vivent. iv. p. 351 [12].
Dædalochila tholus (Binn.), Tryon, Am. Journ. Conch. iii. pp. 64, 78, t. 3 (10). figg. 7, 9 [13].
Helix couloni, v. Mart. in Malak. Blätt. xii. p. 22 (1865) (nec Shuttl.) [14].

Hab. North America: Texas [9 10 12]; Washington County, Texas [14].
E. Mexico: Vera Cruz, one worn specimen, 10 millim. in diameter (*Friedel* [14]).

Recognizable by the convex upper side, and by the distinct spiral groove on the side of the penultimate whorl within the umbilicus, which is more or less wide, but always open, not obstructed. It varies much in size, the largest specimens (*tholus*) measuring 11 millim., the smallest, from Texas, scarcely 7 millim. The arrangement of the teeth is essentially the same as in *P. texasiana*.

6. **Polygyra yucatanea.**

Helix yucatanea, Morelet, Test. Noviss. i. p. 9 (1849) [1]; Pfr. Monogr. Helic. Vivent. iii. p. 263 [2]; Folin, Journ. de Conch. xiii. p. 68 (1865) (living animal, eggs) [3].
Helix (*Polygyra*) *yucatanea* (Morel.), Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 277, t. 12. figg. 14, 14 *a* [4].
Triodopsis yucatanea (Morel.), Tryon, Am. Journ. Conch. iii. p. 52, t. 4 (9). fig. 17 (very bad) (1867) [5].

Hab. S.E. Mexico: Tabasco [2] (*Morelet* [1], *Höge*); San Juan Bautista, Tabasco (*H. H. Smith*).
Yucatan (*Morelet* [1]); Carmen Island [5], at the Laguna de Terminos (*Sallé* and *Cloué* [4]).

Var. *helictomphala*.

Helix helictomphala, Pfr. P. Z. S. 1856, p. 377 [6]; Malak. Blätt. iii. p. 230 (1856) [7]; Monogr. Helic. Vivent. iv. p. 314 [8].
Helix (*Polygyra*) *helictomphala* (Pfr.), Fisch. & Crosse, loc. cit. p. 272, t. 12. figg. 10, 10 *a–c* [9].
Polygyra helictomphala (Pfr.), Strebel, Beitr. Mex. Land- und Süssw.-Conch. iv. p. 46, t. 15. fig. 11 [10].

Hab. S.E. Mexico: San Juan Bautista, Tabasco (*H. H. Smith*).
Chiapas (*Ghiesbreght* [6–9]).

A specimen obtained by Höge in Tabasco proves that *P. yucatanea*, Morel., and *P. helictomphala*, Pfr., belong to one and the same species, an affinity previously suspected by Fischer and Crosse. This shell is quite flat above, and the upper external tooth is distinctly larger than the lower one; in all other respects, especially in the costulation, it fully agrees with a specimen of *P. helictomphala* given by Cuming to

Albers, which has the spire a little elevated, and the upper external tooth scarcely larger than the lower one.

The variety approaches *P. plagioglossa*, but can be distinguished from it by the umbilicus being larger, and surrounded by an obtuse angle, and by the flat upper side.

7. **Polygyra plagioglossa.**

Helix plagioglossa, Pfr. P. Z. S. 1859, p. 26, t. 43. fig. 3 [1]; Malak. Blätt. p. 33 (1859) [2]; Monogr. Helic. Vivent. v. p. 420 [3].

Helix (*Polygyra*) *plagioglossa* (Pfr.), Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 270, t. 12. figg. 9, 9 *a–c* [4].

Polygyra plagioglossa (Pfr.), Strebel, Beitr. Mex. Land- und Süssw.-Conch. iv. p. 45, t. 15. fig. 12 [5].

Hab. Central Mexico: State of Puebla (*Boucard* [4]; *Berkenbusch, in mus. Berol.*).
S. Central Mexico: Oaxaca [5] (*Sallé* [1–3], *Boucard* [4]).

Characterized by the comparatively small and simple, obliquely placed, parietal plait, and in this respect resembling *P. couloni*, Shuttl., but much more flat.

8. **Polygyra dissecta,** sp. n. (Tab. VII. figg. 7, 7 *a–c*.)

Testa anguste et pervie umbilicata, subdepressa, leviter striatula, fulvo-cornea, nitidula; spira breviter conoidea; anfr. $5\frac{1}{2}$, convexiusculi, ultimus rotundatus, basi valde convexus, ad aperturam constrictus et deflexus; apertura perobliqua, late lunata, peristomate reflexo, albo; paries aperturalis plica obliqua modice simplice munitus, margo externus dentibus 2 humilibus subelongatis margini parallelis incisura angusta triangulari separatis, margo basalis denticulo uno parvo obtuso.
Diam. maj. 9, min. $7\frac{1}{2}$, alt. $3\frac{1}{2}$; apert. diam. 4, lat. obliq. 4 millim.

Hab. Central Mexico: Toluca (*Höge*).

One specimen only. In general appearance very like *H. plagioglossa*, but to be distinguished by the two laminar teeth on the outer margin.

9. **Polygyra couloni.** (Tab. VII. figg. 6, 6 *a–d*.)

Helix couloni, Shuttl. in Bern Mittheil. 1852 (Diagn. no. 2, p. 17), p. 197 [1]; Pfr. Monogr. Helic. Vivent. iii. p. 264 [2].

Helix (*Polygyra*) *couloni* (Shuttl.), Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 282 [3].

Anchistoma couloni (Shuttl.), H. & A. Adams, Gen. Moll. ii. p. 282 [4].

Polygyra couloni (Shuttl.), Strebel, Beitr. Mex. Land- und Süssw.-Conch. iv. p. 46, t. 3. fig. 4 [5].

Hab. E. Mexico: Cordova, probably collected by Jacot-Guillarmod [1–4]; Environs of Jalapa (*Doña Estefania* [5]); Maltrata, on the Mexico and Vera Cruz railway, a little west of Orizaba, woody hills (*Höge*).
Central Mexico: Sayula in the State of Jalisco, Mexico city, and Cuernavaca, S. of the city of Mexico (*Höge*).
S.W. Mexico: Omilteme, State of Guerrero (*H. H. Smith*).

In its fawn-colour, faint sculpture, and simple parietal plait, this species approaches very near the subgenus *Triodopsis*, and might equally well be placed in it.

It varies much in size: the largest example I have seen is from Mexico city, and it measures 10 millim. in diameter and 7 in height; the smallest is an excessively little specimen from Sayula, $7\frac{1}{2}$ millim. in diameter and 4 in height. This Sayula shell has half a whorl less than the other specimens from the same locality (which are 9 millim. in diameter), but the aperture is distinctly bent down, and the thickening of the peristome, the plait, and teeth are present, though somewhat thin; these parts may have become thicker if the animal had lived longer, but they could scarcely have sensibly increased in diameter, because the aperture is essentially formed already; it may be called a *prematurе* specimen. By the separation of an accidental fracture during life the aperture can be somewhat deformed, even so as to show a prominent angle in the edge itself and a reduction of the ordinary teeth; such specimens are easily recognized by the irregularity in the lines of growth.

10. **Polygyra bicruris.** (Tab. VII. figg. 8, 8 *a–c*.)

Helix bicruris, Pfr. P. Z. S. 1857, p. 109 [1]; Monogr. Helic. Vivent. iv. p. 315 [2].

? *Helix* (*Polygyra*) *bicruris* (Pfr.), Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 280, t. 12. figg. 13, 13 *a–c* [3].

Hab. N.W. Mexico: Tres Marias Islands (*Forrer*, *Richardson*); Ventanas, State of Durango (*Höge*); Mexico, without nearer indication of locality (*coll. Cuming* [1 2]).
? Chiapas (*Sallé* [3]).

The specimens from Durango are more depressed than the figure given by Fischer and Crosse; and the upper external tooth is a direct prolongation of the other, as described by Pfeiffer, whereas in Fischer and Crosse's figure the upper tooth is separated and looks as if it would come forth behind the other. Therefore I am not sure if our species is really the same as that of Fischer and Crosse, more especially as the localities are widely separated.

11. **Polygyra richardsoni,** sp. n. (Tab. VII. figg. 9, 9 *a–c*.)

Testa obstructe perforata, subdepressa, leviter striatula, fulvo-fusca, nitidula; spira breviter conoidea; anfr. 5, convexiusculi, ultimus rotundatus, basi valde convexus, ad aperturam distinctius striatus, deflexus et constrictus; apertura perobliqua, lunata, peristomate reflexo, albo; paries aperturalis plica inæqualiter bicruri munitus, margo externus dente mediocri obtuso, superne in laminam margini parallelam elongato, margo basalis dente uno mediocri, subcompresso, verticali.

Diam. maj. 9–11, min. 8–$9\frac{1}{2}$, alt. 4–5; apert. diam. $5\frac{1}{2}$, lat. obliq. $5\frac{1}{2}$ millim.

Hab. N.W. Mexico: Presidio de Mazatlan, State of Sinaloa (*Richardson*).

Near *P. triodontoides*, Bland, but with the umbilicus still more obstructed, only the last part of the penultimate whorl visible within it (as in *P. ariadnæ*), the basal and external tooth nearer to one another, and the latter more distinctly prolonged upwards into a lamina.

12. **Polygyra ventrosula.** (Tab. VII. figg. 10, 10 *a–c*, 11.)

Helix ventrosula, Pfr. P. Z. S. 1845, p. 131 [1]; in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, *Helix*, i. p. 373. no. 385, t. 65. figg. 5, 6 [2]; Monogr. Helic. Vivent. i. p. 417 [3]; Reeve, Conch. Icon. vii., *Helix*, t. 118. fig. 687 (good) [4]; Binney, Terr. air-breath. Moll of N. Am. iv. p. 72, t. 77. fig. 14 [5]; Bland, Ann. Lyc. N. York, vii. p. 444 (1861) [6], and viii. pp. 24, 32 (1863) [7]; Binney & Bland, Land and Fresh-water Shells of N. Am. i. p. 92. figg. 164 (shell), 165 (jaw), 166 (radula) [8]; Tryon, Proc. Acad. Phil. 1863, p. 281 [9].

Dædalochila ventrosula (Pfr.), Tryon, Am. Journ. Conch. iii. pp. 63, 80, t. 5 (10). fig. 39 (bad) (1867) [10].

Helix (*Polygyra*) *ventrosula* (Pfr.), Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 274 [11].

Polygyra ventrosula (Pfr.), Binney, Terr. air-breath. Moll. of N. Am. v. (Bull. Mus. Comp. Zoöl. Harv. Coll. iv.), p. 269. figg. 166, 167, and p. 263. fig. 157 [12]; Manual of Am. Land-Shells (Bull. U. S. Nat. Mus. no. 28), p. 367. figg. 400, 401, and p. 360. fig. 391 [13].

Hab. North America: Texas [1–5 8 10–13].

N.W. Mexico: Tres Marias Is. (*Forrer*); near Mazatlan (*Rémond* [9 11]); Sierra Madre [8]; Colima, in the Sierra Madre, State of Jalisco (*Xantus* [10]); Tepic, State of Jalisco (*Richardson*); Mexico, without nearer indication of locality [5 8 11 12 13] (*Hinds* [1–4]).

Var. *hindsi*: minor.

Helix hindsi, Pfr. P. Z. S. 1845, p. 132 [14]; in Martini & Chemnitz, loc. cit., *Helix*, i. p. 373. no. 386, t. 65. figg. 7, 8 [15]; Monogr. Helic. Vivent. i. p. 416 [16]; Reeve, Conch. Icon. vii., *Helix*, t. 120. fig. 712 [17]; Binney, Terr. air-breath. Moll. of N. Am. iii. p. 17 [18], and iv. p. 92, t. 78. figg. 5, 6, 8 [19]; Bland, Ann. Lyc. N. York, viii. p. 32 (1863) [20]; Binney & Bland, Land and Fresh-water Shells of N. Am. i. p. 93 [21].

Helix (*Polygyra*) *hindsi* (Pfr.), Fisch. & Crosse, loc. cit. p. 273 [22].

Dædalochila hindsi (Pfr.), Tryon, Am. Journ. Conch. iii. pp. 63, 79, t. 5 (10). figg. 24, 44 (not good) (1867) [23].

Polygyra hindsi (Pfr.), Binney, Terr. air-breath. Moll. of N. Am. v. p. 269 [24]; Manual of Am. Land-Shells, p. 368 [25].

Hab. North America: Texas [14–17 21–25].

? Mexico, without nearer indication of locality [21–25] (*Hinds* [14–16]).

Easily recognizable by the two teeth on the lower margin of the aperture. According to Pfeiffer [14], his *Helix* (*Polygyra*) *hindsi* is not only much smaller (8 millim. in diam.) than *P. ventrosala* (13 millim. in diam.), but is also distinct by reason of its less inflated shell and more open umbilicus. He even places *P. hindsi* in the section "pervio-umbilicatæ" and *P. ventrosula* in another section "oblique et impervie umbilicatæ": in the figures given by himself [2 15] the umbilicus of *P. ventrosula* is distinctly narrower than that of *P. hindsi*, but also well rounded, not "rimato-perforata." Of two specimens collected by Forrer on the Tres Marias Islands, the larger one (fig. 10), 12 millim. in diam., has the umbilicus as widely open and pervious as Pfeiffer's figure of *P. hindsi*,

and the smaller one (fig. 11), 10 millim. in diam., has a similar umbilicus; both are somewhat more depressed than Pfeiffer's figures, but it is probable that his *P. ventrosula* has the appearance of being somewhat more inflated than the shell really was, as it is drawn not exactly in profile, but somewhat from below. Binney's figures of *P. ventrosula* [8 12 13] give the general form of the shell very well. It appears that there is a large amount of variation in the size, and also to some extent in the comparative narrowness, of the umbilicus and in the elevation of the spire.

The teeth of the aperture are exactly similar in the three specimens now before me—the two collected by Mr. Forrer, and one "*P. hindsi*" of 8 millim. in diam.—viz., a very distinct blunt one at the lower end of the outer margin of the aperture, and above it, separated by a small notch, a subvertical elongated compressed tooth, parallel to the margin, somewhat more feeble in the middle, and swelling towards both ends, the upper and the lower; on the basal or lower margin two blunt teeth, the outer one larger than the other, the inner one broader than high. The plait on the inner side of the aperture is very distinctly two-branched; but its ends are not contiguous with the insertion of the upper and lower end of the outer margin. In this respect there may be some variation, as in Pfeiffer's drawing they are contiguous, and also his description says "marginibus . . . callo bicruri junctis" and "marginibus . . . lamellas in ventre anfr. penultimi angulatim junctas emittentibus." In all other respects Pfeiffer's description, and his drawing of the teeth (fig. 5)[2], agrees very well with our specimens. Less accurate is the drawing of the teeth in his figure 7 (*hindsi*)[15] and in that of Tryon and Binney. Tryon's fig. 35 (*ventrosula*)[11] and Binney's fig. 167 (*hindsi*)[21], repeated in his three works[23 24 25], are so incorrect with regard to the teeth of the aperture that I would not even quote them.

13. **Polygyra texasiana.**

Helix texasiana, Moricand, in Mém. Soc. d'hist. Nat. de Génève, vi. p. 538, t. 1. fig. 2 (1833)[1]; Deshayes in Lamarck's Hist. Nat. d'anim. sans vert. ed. 2, viii. p. 133[2]; Pfr. Monogr. Helic. Vivent. i. p. 418[3]; in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, *Helix*, i. p. 85. no. 56, t. 10. figg. 11, 12[4]; Ferd. Römer, Texas, p. 455 (1849)[5]; Deshayes, in Férussac's Hist. Nat. des Moll. terr. i. p. 74, t. 69 D. fig. 2 (good)[6]; Binney, Terr. air-breath. Moll. of N. Am. ii. p. 191, t. 45. fig. 1[7]; Reeve, Conch. Icon. vii., *Helix*, t. 120. fig. 707[8]; Bland, Ann. Lyc. New York, viii. p. 32 (1863)[9]; v. Mart. in Malak. Blätt. xii. p. 22 (1865)[10]; Binney & Bland, Land and Fresh-water Shells of N. Am. i. p. 93. fig. 168[11], and Suppl. i. p. 151[12].

Dædalochila texasiana, Tryon, Am. Journ. Conch. iii. p. 62 (excl. fig.) (1867)[13].

Helix (*Polygyra*) *texasiana* (Moric.), Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 279[14].

Polygyra texasiana (Moric.), Binney, Terr. air-breath. Moll. of N. Am. v. (Bull. Mus. Comp. Zoöl. Harv. Coll. iv.), p. 270, t. 6. fig. 9 (radula)[15]; Manual of Am. Land-Shells, p. 369. fig. 403[16]; Strebel, Beitr. Mex. Land- und Süssw.-Conch. iv. p. 46, t. 15. fig. 13[17].

Helix (*Tridopsis*) *tridonia*, Beck, Index Moll. 1838, p. 22 [18].

Helix (*Polygyra*) *tamaulipasensis*, Lea, Proc. Acad. Phil. 1857, p. 102 [19]; Obs. Gen. Unio, xi. t. 24. fig. 113 [20].

Hab. North America: Fort Gibson, Indian Territory [16]; Texas [1–8 11–17 19].

N.E. Mexico: State of Tamaulipas (*Lieut. Couch* [11 14]).

? E. Mexico: Vera Cruz, only a dead shell (*Uhde* [10]); Mexico, without nearer indication of locality (*Höge*).

Variable in size, like other species of the genus *Polygyra*.

14. **Polygyra behri.**

Helix (*Polygyra*) *behrii*, Gabb, Am. Journ. Conch. i. p. 208, t. 19. figg. 5–9 (good) (1865) [1]; Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 276 [2].

Helix behrii (Gabb), Pfr. Monogr. Helic. Vivent. v. p. 424 [3].

Dædalochila behrii (Gabb), Tryon, Am. Journ. Conch. iii. pp. 64, 80, t. 5 (10). figg. 40, 41, 43 (1867) [4].

Hab. N.W. Mexico: Guaymas, State of Sonora (*Gabb* [1–4]).

Aperture and umbilicus like those of *P. texasiana*, but size larger, spire quite flat, and whorls less narrow.

15. **Polygyra ariadnæ.**

Helix ariadnæ, Pfr. in Zeitschr. für Malak. 1848, p. 120 [1]; in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, *Helix*, i. p. 372. no. 384½, t. 65. figg. 29–31 [2]; Monogr. Helic. Vivent. iii. p. 266 [3], and iv. p. 318 [4]; Binney, Terr. air-breath. Moll. of N. Am. iv. p. 76, t. 78. figg. 1, 3, 4 [5]; Bland, Ann. Lyc. N. York, viii. pp. 24, 33 (1863) [6]; v. Mart. in Malak. Blätt. xii. p. 22 (1865) [7]; Binney & Bland, Land and Fresh-water Shells of N. Am. i. p. 104, fig. 180 [8].

Anchistoma ariadnæ (Pfr.), H. & A. Adams, Gen. Moll. ii. p. 103 [9].

Dædalochila ariadnæ (Pfr.), Tryon, Am. Journ. Conch. iii. pp. 66, 78, t. 5 (10). figg. 15, 16, 18 (1867) [10].

Helix (*Polygyra*) *ariadnæ* (Pfr.), Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 287, t. 12. figg. 8, 8 *a–c* [11].

Polygyra ariadnæ (Pfr.), Binney, Terr. air-breath. Moll. of N. Am. v. (Bull. Mus. Comp. Zoöl. Harv. Coll. iv.) p. 280, fig. 179 [12]; Manual of Am. Land-Shells, p. 376, fig. 411 [13]; Strebel, Beitr. Mex. Land- und Süssw.-Conch. iv. p. 50, t. 3. fig. 3 [14].

Helix (*Polygyra*) *couchiana*, Lea, Proc. Acad. Phil. 1857, p. 102 [15]; Obs. Gen. Unio, xi. p. 139, t. 24. fig. 112 [16].

Hab. North America: Texas [15 16], in the region of the Rio Grande [8 12].

N.E. Mexico: Tamaulipas [12] (*Dr. Berlandier* [5 11]; *Lieut. Couch* [8]); Matamoros [4 11].

E. Mexico: only dead shells, on the shore of Vera Cruz (*Uhde* [7], *Strebel* [14]).

In this species the umbilical region is filled up by a part of the penultimate whorl, and is therefore only marked by an arcuate slit, with a very minute point-like hole.

The locality from whence Pfeiffer's original specimens [1] were obtained is not known. The specific name alludes to the clue given by Ariadne to Theseus in the Greek mythology; therefore the genitive form "*ariadnæ*" is correct.

16. **Polygyra acutedentata.**

Helix (*Polygyra*) *acute-dentata*, Binney, Proc. Acad. Phil. 1857, p. 183 [1]; Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 288 [2].

Helix acutedentata, Binney, Terr. air-breath. Moll. of N. Am. iv. p. 23, t. 76. fig. 1 [3]; Pfr. Monogr. Helic. Vivent. iv. p. 352 [4]; Binney & Bland, Land and Fresh-water Shells of N. Am. i. p. 103, fig. 179 [5].

Dædalochila acutedentata (Binn.), Tryon, Am. Journ. Conch. iii. pp. 65, 78, t. 5 (10). figg. 11, 13 (1867) [6].

Helix unguifera, Mousson, in some collections.

Var. *loisa*.

Helix (*Polygyra*) *loisa*, Binney, Proc. Acad. Phil. 1857, p. 183, t. 76. fig. 2 [7].

Helix loisa (Binn.), Pfr. Monogr. Helic. Vivent. iv. p. 351 [8].

Dædalochila loisa (Binn.), Tryon, Am. Journ. Conch. iii. t. 5 (10). figg. 12, 14 (1867) [9].

Helix (*Polygyra*) *acutedentata*, var. *quinquedentata*, Fisch. & Crosse, loc. cit. p. 289 [10].

Hab. N.W. Mexico: Guaymas, Sonora [4]; Mazatlan river, Sinaloa (*Gumbel* [1–10]); Mazatlan (*Forrer*).

Very remarkable by the hooked and pointed shape of the middle external tooth, which is directed to the outside of the aperture, as a defensive weapon; and which has an analogue in another American species, *Helix* (*Labyrinthus*) *uncigera*, Petit.

Another variety is said to be found in Texas [7].

17. **Polygyra anilis.**

Helix (*Polygyra*) *anilis*, Gabb, Am. Journ. Conch. i. p. 209, t. 19. figg. 1–4 (1865) [1]; Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 269 [2].

Helix anilis (Gabb), Pfr. Monogr. Helic. Vivent. iv. p. 427 [3].

Polygyra anilis (Gabb), Tryon, Am. Journ. Conch. iii. pp. 158, 176, t. 7 (11). figg. 17, 18 (1867) [4].

Hab. N.W. Mexico: Guaymas, Sonora (*Gabb* [1–4]).

Very distinct from all others of the genus by the want of an external tooth in the aperture.

STROBILA.

Strobila, Morse, Journ. Portland Soc. i. p. 26 (1864) (nec Sars, 1835, juvenile state of *Medusa*).

Shell globose-conic, with thickened peristome and internal revolving lines on the

upper wall of the aperture. Jaw ribbed. Radula like that of *Helix*: lateral teeth bicuspid; marginals low, broad, serrated.

COMPARATIVE TABLE OF THE SPECIES OF *STROBILA*.

Nomen.	Figura.	Sculptura.	Umbilicus.	Apertura.	Coolratio.	Diam.	Alt.	Anfr.	Patria.
						mm.	mm.		
labyrinthica, *Say*...	convexe conica, subangulata.	supra oblique costulata, infra lævigata.	angustus.	reflexa, plica parietali distincta.	fulva.	2–3	$1\frac{1}{2}$–2	5–6	N. America, E. Mexico.
salvini, *Tristr.*	trochiformis, distincte angulata.	„	latus.	„	„	3	$2\frac{1}{3}$	$5\frac{1}{2}$	N. Guatemala.

1. Strobila labyrinthica.

Helix labyrinthica, Say, Journ. Acad. Phil. i. p. 124 (1817) [1], and in Nicholson's Encycl. ed. 3, iv. p. 7 (1819) [2]; Férussac, Prodr. p. 34. no. 111 (1821) [3], and Hist. Nat. Moll. terr. t. 51 B. fig. 1 [4]; Binney, Bost. Journ. Nat. Hist. iii. p. 393, t. 26. fig. 1 (1837) [5]; A. Gould, Report Invert. Mass. p. 184, fig. 106 (1841) [6], and ed. 2, p. 415, fig. 626 [7]; Pfr. Symb. Helic. ii. p. 31 [8]; Monogr. Helic. Vivent. i. p. 416 [9]; in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, *Helix*, i. p. 382. no. 397, t. 66. figg. 17–20 [10]; Reeve, Conch. Icon. vii., *Helix*, t. 122. fig. 728 [11]; Binney, Terr. air-breath. Moll. of N. Am. ii. p. 202, t. 17. fig. 3 [12], and iv. p. 95 [13]; Whiteaves, Canad. Nat. 1863, p. 24 [14]; Morse, Am. Nat. i. p. 545, figg. 41, 42 [15]; Binney & Bland, Land and Fresh-water Shells of N. Am. i. pp. 84, 85, figg. 150–154 (with jaw and radula) [16].

Strobila labyrinthica (Say), Morse, Journ. Portland Soc. i. p. 26, figg. 64–67 (1864) [17]; Tryon, Am. Journ. Conch. ii. p. 259, t. 19 (4). fig. 44 [18]; Binney, Terr. air-breath. Moll. of N. Am. v. (Bull. Mus. Comp. Zoöl. Harv. Coll. iv.) pp. 258–260, figg. 149–152 [19]; Manual of Am. Land-Shells (Bull. U. S. Nat. Mus. no. 28), pp. 263–265, figg. 279–283 [20]; Strebel, Beitr. Mex. Land- und Süssw.-Conch. iv. p. 43, t. 4. figg. 6, 6 *a*, *b*, t. 11. fig. 2 (radula) [21].

Helix strebeli, Pfr. in Malak. Blätt. viii. p. 71, t. 1. figg. 5–8 (1861) [22]; Monogr. Helic. Vivent. v. p. 222 [23].

Helix (*Strobila*) *strebeli* (Pfr.), Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 267, t. 12. figg. 7, 7 *a*, *b* [24].

Hab. NORTH AMERICA: Lower Canada, Island of Orleans, Montmorenci Falls [14]; United States, from Maine [16 18], Massachusetts [9 10 16], and Wisconsin [16] to Mississippi [6 7 18] and Texas [9 10 18], usually in the fissures of decaying wood or in heaps of decaying leaves.

E. MEXICO: Mirador, in the State of Vera Cruz (*Berendt & Strebel* [21–24]); environs of Vera Cruz (*Strebel* [21]).

Variable in the elevation of the spire and in the number of the ribs. Strebel

himself [21] treats *S. strebeli* as synonymous with the N.-American *S. labyrinthica* (Say). The pretended identity with the allied European eocene and pliocene forms is refuted by Sandberger, Land- und Süssw.-Conch. der Vorwelt, 1870–75, pp. 277, 726.

2. **Strobila salvini.** (Tab. X. figg. 1, 1 *a–c*.)

Helix salvini, Tristram, P. Z. S. 1863, p. 411 [1]; Pfr. Monogr. Helic. Vivent. v. p. 334 [2].
Helix (*Fruticicola*) *salvini* (Tristr.), Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 260 [3].

Testa latiuscule umbilicata, trochiformis, angulata, fulva, supra oblique costulata, infra lævigata, *laminis tribus spiralibus perlucentibus*; spira conica; anfr. $5\frac{1}{2}$, vix convexiusculi; apertura sat obliqua, lunaris, peristomate incrassato, breviter reflexo, paries aperturalis plica intrante subobliqua munitus.
Diam. maj. 3, min. $2\frac{1}{2}$, alt. $1\frac{1}{2}$–2 millim.

Hab. N. Guatemala: Mountain-forests of Vera Paz (*Salvin* [1–3]).

An inspection of the typical specimens, kindly lent me by Canon H. B. Tristram, enables me to give a fuller description of this species, which proves to be nearly allied to *S. labyrinthica* (Say). The riblets of the upper surface cross the angle of the periphery and extend a little way on the lower face of the shell. The umbilicus occupies about one third of the diameter of the shell, whereas in *S. labyrinthica* it occupies only about one fifth of it.

The internal lamellæ are in this species about the same as in *S. labyrinthica*, according to the description given by E. Morse and the figures contained in Binney's works. Two whitish spiral lamellæ are visible from outside at the base, shining through the shell, more distinctly in young shells than in full-grown ones, because in those the shell is thinner; they are situated really on the upper side of the lower wall of the last whorl. Two others, situated on the lower side of the upper wall or ceiling (parietal lamellæ), are to be seen by looking into the aperture of a not full-grown shell; the uppermost, or that nearest the suture, is the longest, extending even somewhat beyond the limit of the aperture in the observed specimen, the following one is shorter and lies more beneath—it corresponds to the third of *S. labyrinthica* in the above-mentioned figures. A corresponding lamella to the second of *S. labyrinthica* is not visible in the specimens of *S. salvini*, probably only because it does not come so near to the aperture, and I would not break the only shell which exhibited clearly those lamellæ by seeking for it. Under an ordinary lens these lamellæ show also in *S. salvini* the repeated swellings described by Morse. In fragments of *S. labyrinthica* from Florida, examined for comparison by myself and Dr. Hilgendorf, under a higher magnifying-power, the swellings appear to be somewhat less regular, and composed of more scattered and shorter points than in the said figures.

LABYRINTHUS.

Labyrinthus, Beck, Index Moll. p. 33 (1838); Albers, Die Helic. ed. 1, p. 121, and ed. 2, p. 184; A. H. & A. Adams, Gen. Moll. ii. p. 200.
Lyrostoma, Swainson, Malacol. p. 329 (1840).

Shell depressed, narrowly umbilicated, of more or less deep brown colour. Aperture nearly horizontal, with a thickened, reflexed, continuous peristome, produced towards the centre of the shell into a more or less prolonged lobe, which descends into the umbilicus or terminates freely overtopping its hole; a large parietal fold on the wall of the aperture formed by the penultimate whorl, more or less flexuous; opposite to it there are on the under (basal) part of the peristome—first, one or two teeth or plaits, forming with it a more or less broad channel, and in addition, where the basal margin rises towards the periphery of the shell, another external basal tooth, often somewhat removed from the margin towards the interior, advancing in some species very near to the external end of the parietal fold, and so narrowing very much the lumen of the aperture. Sometimes a fourth little tooth, situated on the upper roof of the aperture, advances from above towards the same spot, as if completing the cruciform obstruction of it: but this little tooth is the most inconstant; for instance, in *L. hydeanus* it may be present or absent. The teeth or plaits of the basal margin are marked outside the aperture by corresponding grooves. The whole apparatus is probably defensive, pre-

Comparative Table of the Species of *Labyrinthus*.

Nomen.	Figura.	Aperturæ		Dentes		Diam.	Alt.	Patria.
		lobus centralis.	pars peripherica.	marginis interioris.	basalis exterior.			
triplicatus, *v. Mart.* ...	convexo-depressa, obtuse angulata.	rotundatus, brevis.	rotundata.	unicus, parvus, simplex.	remotus, compressus, simplex.	mm. 25–26	mm. 12	E. Costa Rica.
quadridentatus, *Brod.*	trochiformis, distincte angulata.	,,	,,	duo, prior obtusus humilis, secundus transversus.	subremotus, triangularis, compressus.	20	11	S.W. Costa Rica.
uncigerus, *Petit*.....	depresse lenticularis, acute carinata.	,,	obtuse angulata.	subcompressus, transversus.	remotus, acutus, curvatus.	29–36	13½	Isthmus of Panama.
annuliferus, *Pfr.*	lenticularis, acute albo-carinata.	subelongatus, angustior, descendens.	rostrata.	subdepressus, transversus.	magnus, compressus, rotundatus.	34	13	Panama.
plicatus, *Born*	sublenticularis, supra magis convexa, acute carinata.	subelongatus, sat angustus, in umbilicum descendens.	rostrata et paulum emarginata.	mediocris, depressus.	magnus, subquadratus, marginalis.	42–51	17–22	N. Panama.

venting the entrance of beetles, &c. Jaw slightly striated. (Mörch, Journ. de Conch. xiii. p. 381.)

Labyrinthus is nearly confined to the northern part of South America, extending only into the more southern parts of Central America; in Costa Rica it is represented by two species of small size and somewhat simple structure of the aperture. Towards the south it reaches, so far as we know, only to the river Amazon (*L. yatesi*, Pfr.) and its upper confluents in Eastern Peru (*L. furcillatus*, Hupé *, and *L. tarapotonensis*, Moric.).

1. **Labyrinthus triplicatus.** (Tab. X. figg. 2, 2 *a–c.*)

Helix triplicata, v. Mart. in Malak. Blätt. xv. p. 463 (1868) [1]; Pfr. Novitat. Conchol. iii. p. 460, t. 101. figg. 1–3 [2]; Monogr. Helic. Vivent. vii. p. 463 [3].

Helix æsopus, Angas, P. Z. S. 1878, p. 72, t. 5. figg. 11, 12 [4], and 1879, p. 476 [5].

Testa anguste umbilicata, depresse conoidea, obtuse angulata, solida, striata, minute granulata, violaceo-fusca, ad peripheriam pallidior; anfractus 5, ultimus basi convexiusculus, antice deflexus et subtus strangulatus; apertura subhorizontalis, oblongo-auriformis; peristoma carneum, incrassatum, continuum; margo parietalis solutus et breviter erectus, infra umbilicum cum basali conjunctus; margo superior inflexus; margo basalis inde ab umbilico substrictus, medio callosus, tum leviter descendens et plica obtusa nodiformi munitus; pars externa peristomatis rotundata, intus plica brevi, compressa, oblique antrorsum vergente munita; paries aperturalis lamina valde compressa, simplice, marginem non attingente munitus.

Diam. maj. 25, min. 21, alt. 12; aperturæ (incluso peristomate) diam. 14, lat. 8 millim.

Hab. E. Costa Rica (*Carmiol* [1–3]); Buenavista, 3000 feet above the sea (*Boucard* [4]); coast region and hills of Uren, 3000 feet above the sea (*Gabb* [5]).

"Animal grey above, with the foot nearly white" (*Gabb* [5]). I have seen two specimens of this species: in one of them the plait behind the external part of the peristome is obtusely rounded in its fore part, and in the other it is acutely pointed; in other respects they agree with each other.

2. **Labyrinthus quadridentatus.**

Carocolla quadridentata, Broderip, P. Z. S. 1832, p. 30 [1].

Helix quadridentata (Brod.), Pfr. Monogr. Helic. Vivent. i. p. 399 [2]; Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, *Helix,* ii. p. 271. no. 752, t. 123. figg. 9–11 [3]; Reeve, Conch. Icon. vii., *Helix,* t. 101. fig. 557 [4].

Testa anguste umbilicata, subdepresse conica, distincte angulata, solida, striatula, minute granulata, rufo-fusca; anfractus 5, ultimus basi paullulum convexus, antice deflexus et leviter constrictus; apertura fere horizontalis, oblongo-triangula; peristoma albidum, incrassatum, continuum; margo parietalis solutus et breviter elevatus, oblique transversus, infra umbilicum cum basali conjunctus; margo superior patulus, inflexus; margo basalis reflexus, medio antrorsum convexus et *biplicatus*, plica interiore nodiformi, non intrante, cæteriore compressa, intrante; pars externa peristomatis rotundata, intus plica brevi, valde compressa, elate triangulari, marginem non attingente munita; paries aperturalis lamina valde compressa, flexuosa, sat longa, marginem non attingente munitus.

Diam. maj. 20, min. 18, alt. 11; apert. diam. 11, lat. 7 millim.

Hab. S.W. Costa Rica: woods near the Golfo Dulce (*Cuming* [1]); Terraba, at an elevation of 200 to 300 metres, in woods (*H. Pittier*, 1891).

* *Helix furcillata,* Hupé, in Pfeiffer's Monogr. Helic. Vivent. vii. p. 462, is stated to be from "Panama," but this is probably a misprint for "Peruvia."

Nearly allied to the preceding, but differs in the presence of two basal plaits, the distinct angle in the periphery of the shell, and the more elevated spire.

I give a full description from a specimen sent by H. Pittier, and have no doubt that it belongs to Broderip's species; Reeve's figure [4] corresponds exactly. In some collections the Venezuelan *L. tamsianus* (Dunker) or *L. leucodon* (Pfr.) is labelled *L. quadridentatus*.

Pfeiffer [2 3] and Reeve [4] merely quote Central America as the locality; but Broderip [1] gives Golfo Dulce, on the Pacific coast.

3. **Labyrinthus uncigerus.**

Carocolla uncigera, Petit, in Guérin's Mag. Zool. 1838, t. 113 [1].

Helix uncigera (Petit), Pfr. Monogr. Helic. Vivent. i. p. 398 [2]; in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, *Helix*, ii. p. 206. no. 663, t. 104. figg. 8–10 [3]; Deshayes, in Férussac's Hist. Nat. Moll. Terr. et Fluv. i. p. 385 [4].

Hab. Isthmus of Panama [1–4].

Easily recognizable by the curious hooked tooth within the aperture, which corresponds to the exterior basal one of *L. quadridentatus*, but is somewhat more within the aperture and does not reach the margin.

4. **Labyrinthus annuliferus.**

Helix labyrinthus, var. *sipunculata*, Forbes, P. Z. S. 1850, p. 53, t. 9. figg. 4 *a*, 4 *b* [1].

Helix annulifera, Pfr. P. Z. S. 1851, p. 200 [2], and Monogr. Helic. Vivent. iii. p. 255 [3]; Reeve, Conch. Icon. vii., *Helix*, t. 100. fig. 555 [4].

Hab. Panama [2 3] (*Kellett and Wood* [1]).

A variety of larger size, with thicker peristome, viz. *H. erecta*, Mœuss., occurs more to the south in Colombia.

5. **Labyrinthus plicatus.**

——, Seba, Thesaurus, iii. p. 123, t. 40. figg. 24, 25 (1761) [1].

Helix plicata, Born, Index Test. Mus. Cæs. 1778, p. 376 [2], and Test. Mus. Cæs. 1780, p. 368 [3]; Tate, Am. Journ. Conch. v. p. 156 (1866) [4]; Brauer, Sitzungs-Ber. Akad. Wien, lxxvii. p. 180 (1878) [5].

Helix labyrinthus (Chemn.) (part.), Férussac, Hist. Nat. Moll. Terr. et Fluv. t. 154 B. fig. 5 [6]; Pfr. Monogr. Helic. Vivent. i. p. 398 [7]; Reeve, Conch. Icon. vii., *Helix*, t. 100. fig. 550 [8]

Hab. N. Panama: north shore of Naval Bay, Colon, in a forest (*Tate* [4]).

It is not quite certain whether Tate's shell [4] belongs to *L. plicatus*, as there are some nearly allied species, or perhaps rather varieties, in Colombia and Venezuela which have often been confounded with it—as, for instance, *L. hydeanus* (Lea) and *L. subplanatus* (Petit).

Doubtful Species of Labyrinthus.

As there is some uncertainty regarding *L. hydeanus* and *L. otis* (*labyrinthus*), both of which have often been confounded with *L. plicatus*, and as one of them has been quoted from Panama and the other from Central America, it is advisable to add here the synonymy of these two species.

Labyrinthus hydeanus.

——, Knorr, Vergnüg. der Augen, v. p. 42, t. 26. fig. 5 [1].
Helix labyrinthus (Chemn.), Lamarck, Journ. d'Hist. nat. de Paris, ii. p. 352, t. 42. fig. 4 (1792) [2].
Helix labyrinthus (part.), Férussac, Hist. Nat. Moll. Terr. et Fluv. t. 154 B. fig. 4 [3].
Carocolla labyrinthus, Reeve, Conch. Syst. ii. p. 73, t. 167. fig. 3 [4].
Carocolla hydeana, Lea, Obs. Gen. Unio, ii. p. 74, t. 23. fig. 73 (1836) [5].
Helix plicata (Born), Pfr. Monogr. Helic. Vivent. i. p. 398 [6]; in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, *Helix*, ii. p. 204. no. 662, t. 104. figg. 1–4 [7]; Reeve, Conch. Icon. vii., *Helix*, t. 100. figg. 553 *a*, *b* [8]; v. Mart. in Festschr. d. Ges. naturf. Freunde in Berlin, 1873, p. 168 [9].

Distinct from *L. plicatus* only by the internal lobe of the aperture being not so long and narrow, and by the exterior basal tooth being much smaller, with a much greater interval between itself and the parietal fold. In most specimens this tooth is simply triangular, but it occasionally varies: Lea's figure [5] shows it slightly trilobate. Generally the colour of the shell is of a darker brown and the aperture dirty reddish, not white; but specimens of the true *L. plicatus* are sometimes similarly coloured.

Hab. VENEZUELA: Puerto Cabello (*Gibbon* [5], *Appun* [9]); Caracas (*Lansberg* [9]).

Pfeiffer [6 7] gives also Panama as a locality; but as he identifies the species with *L. plicatus* and does not name the collector, this statement is scarcely trustworthy.

Labyrinthus otis.

——, Favanne, in Dezallier d'Argenville's Conch. ed. 3, t. 63. fig. F 11 (without text) (1780) [1].
Helix otis, Solander, in Portland's Cat. p. 38 (without description) (~~circa~~ 178$) [2].
Helix labyrinthus, Chemnitz, Syst. Conch.-Cab. ed. 1, xi. p. 271, t. 208. fig. 2048 [3] (copied from Favanne), and ed. 2, t. 2. fig. 5 [4]; Pfr. Monogr. Helic. Vivent. i. p. 397 [5], and in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, *Helix*, ii. p. 205. no. (34) (excl. varietat.) [6].
Lyrostoma labyrinthus, Swainson, Malacol. p. 329 [7].

Hab. —— ? Pfeiffer gives [5 6] generally "Central America."

It is possible that Favanne's figure is very incorrectly drawn, and that *L. otis* is simply identical with *L. plicatus* (Born), as the species has not again been found;

L. otis, however, apparently differs from *L. plicatus* in the longer and much narrower, channel-like projection of the peristome into the umbilicus, and in the bipartite internal and the bilobate external basal tooth of the aperture.

Fam. GONIOGNATHA.

Jaw composed of several plates, which are more or less soldered one to the other, but recognizable by their incumbent or free lateral edges at the lower margin. Teeth of the radula subquadrate, not spiniform. Shell generally bulimiform, longer than broad.

This family contains chiefly American genera.

ORTALICHUS.

Bulimus, subgen. *Orthalicus*, Beck, Index Moll. p. 59 (1838); Albers, Die Helic. ed. 1, p. 171 (first definition) (1850).

Bulimi achatinoidei, Pfeiffer, Monogr. Helic. Vivent. ii. pp. 2, 143.

Orthalicus, Troschel, in Archiv für Naturg. 1849, 1, p. 228; Shuttleworth, Notitiæ Malac. i. p. 57; Pfeiffer, Monogr. Helic. Vivent. iv. p. 586; Albers, Die Helic. ed. 2, p. 224; Fischer & Crosse, Miss. Scient. Mex., Mollusca, i. p. 426; Strebel, Beitr. Mex. Land- und Süssw.-Conch. v. p. 1.

Shell imperforated, longitudinally oval or rounded conical, with fine spiral lines, whitish or yellow, with dark bands, either spiral or vertical; the latter, termed streaks (strigæ), ordinarily bent zigzag, and often with some single black markings (varices), which are the remnants of a former peristome, when the shell was not yet adult. Whorls 6–8, steadily increasing. Aperture comparatively large, oval; peristome simple, not reflected, ordinarily with a narrow black edging; columella nearly straight and thin, ordinarily white. Jaw composed of imbricate plates with very oblique lateral margins. Teeth of the radula in oblique rows, converging towards the lower edge in the middle, all provided with a transverse broad blunt edge.

This genus contains but few species, all of rather large size, and most of them beautifully painted. It is confined to the hot regions of America, from Florida and Mazatlan to Bolivia and the central portion of Brazil. The various species live ordinarily on trees, and some have been observed on dye-woods. Those which live in Mexico and Central America are nearly allied *inter se*, and it may be questioned whether they do not run one into the other, so much so as to be regarded as varieties of one and the same species: most authors, however, including Shuttleworth, in his valuable Monograph, have treated them as distinct, and I adopt this plan; but I confess that in some cases it is very difficult to decide to which species a single specimen may belong.

Comparative Table of the Species of *Ortalichus*.

Nomen.	Figura.	Pictura.	Apex.	Peristoma.	Long.	Diam.	Apert.	Patria.
					mm.	mm.	mm.	
princeps, *Sow.*	conico-ovata, latiuscula, anfr. convexis.	albida vel flavida, strigis in zona mediana dilatatis subquadratis nigro-fuscis, in zona supera furcillatis.	plerumque minute fuscus.	subanguste fuscum, callo fusco vel subaurantio.	63 50 74	37 30 42	34 23 37	W., E., & S.W. Mexico, Yucatan, N., W., & S.W. Guatemala, Salvador, Nicaragua, N.W. Costa Rica, Panama.
——, var. fischeri, *v. Mart.*	,,	fulva, strigis paullo magis obscuris numerosis paullum undulatis.	minute fuscus.	anguste fuscum, callo fusco.	60 55	35 33	33 30	W. Guatemala.
ferussaci, *v. Mart.*	ovato-conica, anfr. vix convexis.	albida, strigis sat confertis plerumque simplicibus et fasciis spiralibus 3 fuscis.	minute fuscus vel totus albus.	anguste fuscum, callo fuscescente.	65	33	31	S.W. Mexico, Yucatan, N. & Centr. Guatemala, Nicaragua, N.W. Costa Rica, Venezuela, Guiana, Ecuador.
tricinctus, *v. Mart.*	,,	flava, strigis nullis, fasciis spiralibus 3, supera sæpius obsolescente, periomphalio fusco.	latiuscule nigro-fuscus.	,,	49	24	23	Nicaragua, S. Costa Rica, Colombia, Ecuador, Peru.
zoniferus, *Streb.*	,,	strigis in anfr. ult. confertis, leviter undulatis vel subrectis, lividofuscis.	minutissime fuscus.	,,	60 51	35½ 28	33 27	W. & S.W. Mexico.
——, var. crossei, *v. Mart.*	subelongato-conica, anfr. minus convexis.	strigis numerosis.	minute fuscus.	anguste fuscum, callo fusco.	54	30	28	British Honduras, Costa Rica.
lividus, *v. Mart.*	ovato-conica, anfr. supp. planis.	flavescens, strigis confertis subrectis lividis.	late purpureo - nigro-fuscus.	nigro-fuscum, callo nigro-fusco.	79 62	43 36	43 34	W. & Centr. Mexico.

obductus, *Shuttl.*	ovato-conica, anfr. supp. planiusculis.	virescenti-fusca, fasciis purpurascentibus albido-articulatis, strigis anfr. ult. obsoletis.	minute fusculus.	anguste atro-purpureum, callo fusco.	65 68	38 40	37 23	British Honduras, N. & Centr. Guatemala, Nicaragua, Panama, Venezuela, Ecuador.
boucardi, *Pfr.*	ovato-conica, anfr. convexis.	alba, strigis plus minusve distantibus, latis, nigro-fuscis et pallide rufis, sæpius abbreviatis.	totus pallide flavus.	anguste fuscum, callo pallide fusco.	48	27	25½	S.W. Mexico.
macluræ, *v. Mart.*	ovato-conica.	pallide flava, strigis latis, nigro-fuscis, rectis plerumque non furcatis.	flavidus vel fuscus.	crassiuscule fusco-nigrum.	52	29	27	N.W. Nicaragua.
longus, *Pfr.*	elongato-conica, anfr. modice convexis.	flavescens, strigis confertis, violaceo-fuscis, plerisque rectis, simplicibus, et in anfr. supp. fascia una spirali.	minute fuscus.	nigro-fuscum, callo castaneo.	55	29	27	Centr. & S. Mexico.
livens, *Shuttl.*	subelongato-conica, anfr. planis.	flavescens, strigis in zona mediana latiusculis fuscis, supra et infra obsolescentibus.	late purpureo-fuscus.	anguste fuscum, callo castaneo.	48	22	14	E. Mexico.
——, var. uhdeanus, *v. Mart.*	,,	flavescens, strigis latis sat confertis undulatis purpureo-fuscis, non abbreviatis.	late nigro-purpureus.	subincrassatum, nigro-fuscum, callo castaneo.	55 40	28 23	25 19½	W. Mexico.
ponderosus, *Streb.*	subelongato-conica, anfr. vix convexis. supra suturam tumidis.	fuscescenti-flava, strigis in anfr. ult. confluentibus pallide fuscis.	pallide flavus vel minute fuscus.	incrassatum, late nigro-fuscum, callo castaneo.	72 55	35 28	34 27	W. & S.W. Mexico.
melanochilus, *Val.*	subelongato-conica, anfr. leviter convexis.	fulvescenti-flava, unicolor vel rarius fascia spirali 1-2 angusta.	albidus.	subincrassatum, latiuscule fusco-nigrum.	60 50	34 28	28 21	N.W. Mexico.

In Beck's book the generic name is printed "*Orthalicus*," and all subsequent authors have followed him; but this spelling, although evidently referring to the Greek language, bears no obvious meaning: P. Fischer (Manuel de Conch.) interprets it by ὀρθὸς, straight, and ἀλίκος, a rare Dorian form for the common Greek ἡλίκος, how aged, how great. I am satisfied, however, that it is a misprint for *Ortalichus*, the Greek word ὀρτάλιχος signifying a young fowl, and Beck's first species being the "*gallina sultana*" of former authors, who compared the painting of the shell with the feathers of a fowl.

The sculpture is essentially the same in all species: minute spiral striæ, which are more or less visible, according to the well-preserved or worn surface of the shell, and faint striæ of growth, which are stronger and more or less plait-like immediately below the suture. In some specimens there are also more or less numerous blunt and short impressions, as if caused by the blow of a hammer on a tin plate (impressiones malleatæ); but these are not available for the distinction of the species, as they are variable in individuals from the same locality which agree *inter se* in all other respects. As regards the markings, we may distinguish in each whorl several zones: in the uppermost the dark streaks (strigæ) are generally narrower and often forked upwards; in the middle one or median, corresponding to the middle part of the back of the animal, there are often broader streaks; and in the lower zone, which is covered in the upper whorls by the following one, and only visible in the last, they are again narrower and often paler—this is to be seen very distinctly in most specimens of *O. princeps*. Very often the streaks are angularly bent at the confines of the upper and median and at those of the median and lower zones, and if these angles are prolonged into the next streak, spiral bands may be formed. In many young specimens of *O. princeps*, and also in some other species, there are two dark spiral bands in the lower half of the last whorl, the upper one in the continuation of the suture, the lower one about halfway between it and the centre of the base; very similar bands are to be seen also in some species of *Otostomus* and even in young specimens of the Malayan genus *Amphidromus*.

1. **Ortalichus princeps.** (Tab. X. figg. 3, 3 *a*, *b*, 4–7.)

——, Lister, Hist. s. Synopsis Conch. lib. iv. t. 380. fig. 34 *a* (without name) (1688) [1].

Bulinus princeps (Broderip), Sowerby, Conch. Illustr., *Bulinus*, fig. 18 (1833) [2].

Bulimus (*Orthalicus*) *princeps*, Beck, Index Moll. p. 59 [3].

Orthalicus princeps, Shuttl. Notitiæ Malac. i. p. 64, t. 3. figg. 6, 7 [4]; Pfr. Monogr. Helic. Vivent. iv. p. 589 [5]; Mörch, in Malak. Blätt. vi. p. 112 (1859) [6]; v. Mart. in Malak. Blätt. xii. p. 40 (1865) [7]; Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 455, t. 18. fig. 2 (excl. varr.) [8]; Strebel, Beitr. Mex. Land- und Süssw.-Conch. v. pp. 11–16 (forms A–D, not E, F), t. 3. figg. 1 *a–d*, t. 4. figg. 1–5, 7, 8, 10, t. 8 (anatomy), t. 9. figg. 1–11, and t. 11. figg. 1, 3 (radula), t. 10. figg. 1, 4, 7–10, 12–14, 16, and t. 11. figg. 2 (jaw), 5 (embryonal shell) [9]; Pilsbry, Proc. Ac. Phil. 1891, p. 317 [10].

Bulimus undatus (Brug.), Valenciennes, Recueil d'Observ. Zool. ii. p. 245, t. 55. figg. 1 *a*, *b* (1833) [11].

Bulimus zebra, var. δ, Pfr. Monogr. Helic. Vivent. ii. p. 144 [12].

Bulimus zebra, var., Reeve, Conch. Icon. v., *Bulimus*, t. 15. p. 90 [13].

Bulimus zebra (part.), Binney, Terr. air-breath. Moll. N. Am. t. 54 (the two smaller middle figures) [14].

Orthalicus zebra (Müll.), Carpenter, Cat. Mazatlan Shells, pp. 176, 177 (Tablets 796–801, ? 802) [15]; H. & A. Adams, Gen. Moll. t. 75. fig. 6 *a* (shell) [16].

Hab. Mexico (*Humboldt and Bonpland* [11]).

W. Mexico: Mazatlan (*Reigen* [8 15], *Forrer*), Presidio de Mazatlan (*Richardson*), Tres Marias Islands (*Forrer*, *Richardson*).

E. Mexico: Papantla (*Deppe* [7]); Misantla (*Salas* [9]); Rancho de la Lima and Rancho de Quilate, both near Misantla (*Doña Estefania* [8]); Playa Vicente, in dense oak-forest (*Höge*); Coatepec, above Jalapa (*Strebel*; form C [9]); Almolonga, below Jalapa (*Höge*); Mirador (*Strebel*; form C [9]); Callejones de Malibran, near Vera Cruz, living on trunks of trees and on fences (*Strebel*; form A [9]); Vera Cruz, generally (*Uhde and Friedel* [7]); Cordova (*Höge*); Atoyac, near Cordova (*H. H. Smith*); Vera Cruz (*Sallé* [8], *Heilprin* [10]).

S.W. Mexico: Panistlahuaca and Ixtapa, both in Oaxaca (*Boucard* [8]); Cerro de Acatepec near Tuletepec in Oaxaca, on evergreen oaks (*Shuttleworth* [4]).

Yucatan: Merida (*Strebel*; form D [9]); Tabi, south of Merida (*F. D. Godman*); Shkolak, Ticul, between Sitilpech and Tunkas, and at Silam (*Heilprin* [10]).

N. Guatemala: Cahabon (*Sarg* [8]); Coban (*Conradt*); Senahu and Chacoj (*Champion*), Panzos (*Conradt*), all in the Polochic valley.

W. & S.W. Guatemala: Western lowlands—at Retalhuleu and San Francisco Miramar, also near Capetillo, ascending to an elevation of 3500 feet above the sea,—generally on trees, especially the guava and "volador" (*Stoll*, *in litt.*); El Reposo, below Retalhuleu, Cerro Zunil, and at San Isidro near Mazatenango (*Champion*); San Agustin (*Bocourt*, var. β [8]).

Salvador: Conchagua (*Cuming* [2]).

Nicaragua (*Lévy* [8], *Janson*): woods of Nicaragua, in the hollows of trees (*Cuming* [13]).

N.W. Costa Rica: Guanacaste, at an elevation of 250 metres above the sea, in woods round the Bay of Salinas (*Pittier*).

Panama (*Cuming* [4 5 13]).

Central America, without nearer indication of locality: probably Costa Rica (*Örsted* [6]).

Var. *fischeri*: testa fulva, strigis fuscescentibus angulatis. (Tab. X. fig. 7.)

Orthalicus princeps, var. β, Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 455, t. 18. fig. 2 *b* [17].

Hab. W. Guatemala: El Reposo and San Isidro near Mazatenango (*Champion*).

Guatemala: without nearer indication of locality (*Bocourt* [17]).

The most widely distributed species of this genus within our limits.

Beck [3] and Pfeiffer [12] give Peru as a locality, but this has not been confirmed by subsequent writers. Cuming's specimen figured by Reeve [13] is apparently the same as that figured by Sowerby [2]; but the former gives Nicaragua, the latter Conchagua (in the republic of Salvador) as the locality; the difference, however, is not great, as the Volcan de Conchagua is near the frontier of Nicaragua.

Generally the streaks are very broad and dark in the middle part of the last whorl, becoming narrower in the lower part and bifurcated in the upper third of the same whorl; at the limits of these three parts the streaks are often angulated. There is, however, much variation in this respect. The variety *fischeri* approaches *O. obductus*.

2. **Ortalichus ferussaci.** (Tab. X. figg. 8–10.)

Cochlea vesicaria fluviatilis exotica, &c., Seba, Thesaurus, iii. t. 39. figg. 54, 55 (1761) [1].

Zebra mülleri, Chemnitz, Conch.-Cab. ix. 2, p. 24, t. 118. figg. 1015, 1016 (1786) [2].

Helix undata, Férussac, Hist. Nat. Moll. Terr. et Fluv. t. 115. figg. 1, 4 (living animal) [3]; Tabl. Syst. p. 48. no. 337 (part.) [4].

Bulimus undatus (Brug.), Pfr. in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, *Bulimus*, p. 7 (part.), t. 2. fig. 5 (copy from Chemnitz) [5].

Orthalicus ferussaci, v. Mart. in Monatsber. Akad. Wiss. Berlin, 1863, p. 542 [6]; Malak. Blätt. xii. p. 42 (1865) [7]; Die Binnenmoll. Venez. p. 32, t. 1. fig. 6 (1873) [8]; Pfr. Monogr. Helic. Vivent. vi. p. 199 [9]; Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 447 [10]; Strebel, Beitr. Mex. Land- und Süssw.-Conch. v. pp. 18–23 (form A, form B, in part, and form C), t. 2. figg. 1 *c*, *d*, *e*, 3 *a*, *b*, 4 *a*, *b*, 5 *a*, 6 *a–d*, 7, 8, 9 *a*, *b*, t. 10. figg. 2, 6 (jaw), 17 (anatomy), t. 12. figg. 4 and 5 (radula) [11]; Pilsbry, Proc. Ac. Phil. 1891, p. 317 [12].

Orthalicus zebra, Mousson, in Malak. Blätt. xvi. p. 179 (part.) (1869) [13].

Orthalicus princeps, Stoll, Guatem. Reisen, p. 430 [14].

Hab. S.W. Mexico: Tehuantepec, on a species of *Tabernæmontana*, belonging to the family Apocyneæ (*Deppe* [6 7]).

Yucatan: Shkolak and Tekanto (*Heilprin* [12]).

N. Guatemala: Panzos, in the Polochic valley (*Conradt*); Vera Paz (*Stoll*).

Central Guatemala: San Gerónimo (*Champion*); Zacapa, on a species of *Cereus*, in the treeless region (*Stoll* [14]).

Nicaragua: Acoyapa (*Belt*).

N.W. Costa Rica: Guanacaste (*Pittier*).

Colombia: Region of the lower part of the R. Magdalena, in holes in tree-trunks, not higher than six feet above the ground (*Wallis* [13]); Santa Marta (*Grosskopf* [11]); Rio de la Hacha (*Wessel* [11]); Savana Grande at Santa Marta and valley Cosai (*Sievers*); Sierra Nevada, on the trunks of *Hecastophyllum dubium*, family Papilionaceæ, and at Urumita in the Cordillera de Los Andes (*Sievers*).

Venezuela: Near the Lake of Valencia (*Moritz* [10]); Caracas (*Lansberg* [10]); Angostura, on the Orinoco (*Gruner* [10]).

Guiana (*Schomburgk* [10]).

Ecuador: San Juan de la Costa (*Riess* [11]).

This species is chiefly characterized by the combination of streaks and spiral bands. Some specimens come very near to the young state of *O. princeps*; and others to *O. undatus*, Brug., from the Caribbean islands and Florida, which, however, is ordinarily more elliptically elongated, and has paler, rather bluish-livid, bands and streaks.

O. Stoll describes the living animal as follows:—Body 6 centim. long, rather bulky; back coarsely wrinkled and as warty as that of *Helix pomatia*, brownish-grey, the furrows darker coloured. Upper feelers finely wrinkled, bluish-grey, 17 millim. long, their anterior extemity swollen, ochraceous-yellow; eyes black. Lower feelers pale grey, 45 millim. long; anterior extremity also swollen and ochraceous-yellow, without eye. Face 9 millim. high, 7 broad, convex. Hinder part of the foot flat, pointed, without median crest.

3. **Ortalichus tricinctus.** (Tab. XI. fig. 8.)

Helix undata, Férussac, Hist. Nat. Moll. Terr. et Fluv. t. 115. figg. 3, 5 (living animal) [1]; Tabl. Syst. p. 48, no. 337 (part.) [2].

Bulimus (*Orthalicus*) *zebra* (Müll.), Beck, Index Moll. p. 59 [3].

Orthalicus zebra (Müll.), Shuttl. Notitiæ Malac. p. 61, t. 8. figg. 3, 4 [4]; Pfr. Monogr. Helic. Vivent. iv. p. 589 [5]; H. & A. Adams, Gen. Moll. t. 75. fig. 6 (living animal, copied from Férussac) [6]; Mousson, in Malak. Blätt. xvi. p. 179 (part.) (1869) [7].

Orthalicus princeps, Mörch, in Malak. Blätt. vi. p. 112 (1859) [8].

Orthalicus melanochilus (Val.), Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 458, t. 18. figg. 5, 5 *a* [9].

Orthalicus ferussaci, Form B, 1, Strebel, Beitr. Mex. Land- und Süssw.-Conch. v. pp. 21, 22, t. 2. figg. 2 *a–d*, t. 9. figg. 12, 13, t. 11. fig. 6 (radula), t. 10. figg. 3, 5 (jaw) [10].

Hab. Central America, either Nicaragua or Costa Rica (*Örsted* [8]).

Nicaragua (*Lévy* [9]).

N.W. Costa Rica: Bay of Salinas, in mangrove bushes near the sea (*Pittier*).

S.W. Costa Rica: Quebrada (ravine) del Vijaqual, in the valley of the Rio Saveyre, at an elevation of 150 metres (*Pittier*); woods at Terraba, at an elevation of 250 to 270 metres; Alto de Mano Tigre, 690 metres; Boruca, at an elevation of 450 metres; El Pozo, 50 metres, common in clear primeval woods (*Pittier*); Costa Rica, without nearer indication of locality (*Carmiol, in mus. Berol.*).

Colombia: Santa Marta (*Grosskopf* [10]); Barranquilla and on the borders of the R. Magdalena (*Wallis* [7 10]).

Ecuador: San Juan de la Costa (*Reuss* [10]).

Peru: R. Marañon (*Warscewiez*).

This species has been confounded with the North-Mexican *O. melanochilus*, from which it differs in the more ovate and thinner shell, and the ordinarily well-defined three dark brown spiral bands, the uppermost, however, is in some specimens very pale and thin, or wanting altogether; in the latter character it approaches *O. ferussaci*.

A form of this genus, also with three bands without vertical streaks, is found in the Keys of Florida, see Binney, Land and Freshw. Moll. of N. Am. i. p. 217, fig. 370 (copied in the Terr. air-breath. Moll. N. Am. v. p. 410, fig. 286, and Manual N. Am. Land-Shells, p. 440, fig. 183); this is very probably a variety of *O. undatus*, Brug. The shell figured by some old authors, as Seba, Thesaur. iii. t. 36. figg. 50, 51, and by Favanne, 3rd edition of Argenville's Conchyliologie, t. 65. fig. M 2, may also be a variety of *O. undatus*, Mexico and Central America not having been explored for land-shells at the date of publication of these works.

4. **Ortalichus zoniferus.** (Tab. X. figg. 12, 13.)

Orthalicus zoniferus, Strebel, Beitr. Mex. Land- und Süssw.-Conch. v. pp. 28, 29, t. 1. figg. 7 *a*, 7 *b*, t. 3. fig. 3, t. 11. figg. 7, 7 *a* (radula), 8, 9 (anatomy) [1].

Hab. W. Mexico: Chilpancingo and Venta de Zopilote (*H. H. Smith*), Rancho del Platanillo near Iguala (*Doña Estefania* [1]), Monte Pelegrino, north of Acapulco, in a cave (*Berendt* [1]), all in the State of Guerrero.

S.W. Mexico: Oaxaca (*Höge*).

Var. *crossei*.

Orthalicus princeps, var. γ, Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 455, t. 18. fig. 2 *c* [2].

Hab. British Honduras: Belize (*Bocourt and Parsons* [2]).

Costa Rica (*van Patten, in mus. Berol.*).

This species is allied both to *O. lividus* and *O. princeps*. Young specimens can scarcely be distinguished from *O. princeps*, the characteristic painting being seen chiefly on the last whorl. I have before me two similar shells from Ventanas and Tres Marias Islands, North-west Mexico, collected by Forrer; but, as they are worn and bleached, I dare not refer them with any confidence to *O. zoniferus*.

5. **Ortalichus lividus.** (Tab. X. figg. 11, 11 *a*.)

Bulimus zebra, var., Menke, in Zeitschr. für Malak. vii. p. 163 (1850) [1]; Pfr. in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, *Bulimus*, p. 377, t. 22. fig. 12 [2].

Orthalicus lividus, v. Mart. in Monatsb. Akad. Wiss. Berlin, 1863, p. 542 [3]; Malak. Blätt. xii. p. 57 (1865) [4]; Pfr. Monogr. Helic. Vivent. vi. p. 99 [5]; Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 448 [6]; Strebel, Beitr. Mex. Land- und Süssw.-Conch. v. pp. 29–31, t. 1. fig. 8, t. 4. fig. 6 (and 9?), t. 11. fig. 18 [7].

Hab. W. Mexico: Mazatlan (*Melchers* [1 2]).

Central Mexico: Province of Michoacan, especially at the Volcan de Jorullo (*Uhde* [3–7]).

6. **Ortalichus obductus.**

Orthalicus obductus, Shuttl. Notitiæ Malac. i. p. 62, t. 3. figg. 1–3 [1]; Pfr. Monogr. Helic. Vivent. iv. p. 587 [2]; Mousson, in Malak. Blätt. xvi. p. 179 (1869) [3]; Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 456 [4]; v. Mart. Die Binnenmoll. Venez. p. 33, t. 2. figg. 15 *a*, *b* (jaw and radula) [5]; Binney, Ann. Lyc. N. York, xi. p. 37, t. 6. fig. iii. (radula) (1874) [6]; Strebel, Beitr. Mex. Land- und Süssw.-Conch. v. pp. 33, 34, t. 3. figg. 4 *a*, *b*, 7 *a*, *b*, *c*, t. 3. fig. 6 (radula) [7].

Hab. British Honduras: Belize, in the woods (*Bocourt* [4]).
N. Guatemala: Coban (*Sarg* [7]).
Central Guatemala: San Gerónimo (*Champion*).
Nicaragua (*Lévy* [4]; *coll. Dohrn* [7]).
Panama (*Cuming* [1]), Islands in the Bay of Panama (*MacNiel* [6]).
Venezuela: "Barquimeseto," probably Barquisimeto, S.E. of Valencia (from the late dealer *Ed. Müller* [1 5]); on the borders of the lake of Valencia (*Moritz* [5]); Puerto Cabello (*Strebel* [7]).
Ecuador: Nabon, 8000 feet above the sea (*Wallis* [3]).

Well-characterized adult specimens I know only from Venezuela. Cuming's specimen from Panama [1] was a young shell; Sarg's specimens from Coban are a little different, form B of Strebel [7], and somewhat like a very dark-coloured *O. princeps*. Those from Belize and Nicaragua I have not seen.

7. **Ortalichus boucardi.** (Tab. XI. figg. 4, 5; 11, var.)

Orthalicus boucardi, Pfr. P. Z. S. 1860, p. 138, t. 51. fig. 7 [1]; Malak. Blätt. viii. p. 16 (1861) [2]; v. Mart. Malak. Blätt. xii. p. 37 (1865) [3]; Pfr. Monogr. Helic. Vivent. vi. p. 200 [4]; Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 451, t. 18. figg. 3, 3 *a*, *b* [5]; Strebel, Beitr. Mex. Land- und Süssw.-Conch. v. pp. 40, 41 (forms A, B), t. 1. figg. 1 *a*, 2 *a–g* [6].

Hab. S.W. Mexico: Villa Alta in Oaxaca, on the slope of the central elevated plateau towards the Rio San Juan, copiously (*Höge*); Oaxaca (*Höge*); Mountains of Betaza, 20 leagues from Oaxaca (*Boucard* [2 5 6]); Cerro Negro, Tehuantepec (*Sumichrast* [6]); Tehuantepec (*Strebel* [6], *Richardson*).

This species is easily recognizable by the predominant white colour, with a few black streaks, which are sometimes very widely separated, seldom bent in zigzag; these streaks are often shortened into mere spots, and they are sometimes of a pale rusty colour at the sides. The apex is apparently always white or pale yellowish. The largest specimen (long. 56, diam. and apert. 30 millim.) is from Tehuantepec. The specimens collected by Höge at Oaxaca have more numerous stripes, thus approaching *O. zoniferus*.

8. **Ortalichus macluræ,** sp. n. (Tab. XI. figg. 1, 2, 3.)

Testa ovato-conica, solida, subtiliter spiratim striatula, ad suturam plicatula, flavescens, strigis latis subrectis nigro-fuscis picta; anfr. $6\frac{1}{2}$, paullum convexi, superiores 3 flavidi, non strigati, apice sæpius fusco, ultimus regulariter ovatus; apertura dimidia longitudine brevior, peristomate latiuscule nigro-fusco, crassiusculo, columella alba, callo intensive castaneo-fusco. Long. 52, diam. 29, apert. 27 millim.

a. Anfractu ultimo æqualiter strigato, apice pallido vel minute fusco. (Fig. 3.)

b. Anfractu ultimo strigis confluentibus, antrorsum subæqualiter fulvo, varicibus iteratis, fasciis spiralibus 2 ab anfractu quarto usque in partem anfr. ultimi continuatis, apice late fusco-nigro, columella anguste albescente. (Fig. 2.)

c. Albinus, strigis et callo perpallide fulvis; apice et peristomate albis. (Fig. 1.)

Hab. N.W. Nicaragua: Cacao, in the Bay of Fonseca, on trees of the yellow-wood, *Maclura aurantiaca,* fam. Moreæ (*Capt. Joh. Schäffer*).

Owing to the kindness of Fr. Borcherding, Vegesack, Bremen, I have before me twenty-two specimens collected at the same locality, which cannot be separated specifically one from the other. The ground-colour is a very pale yellow, in worn specimens white; the streaks are broad, dark blackish-brown, the interstices between them mostly about equal in width to the streaks themselves; in the upper whorls, however, the interstices are often even broader, and in this respect young, somewhat bleached, specimens very much resemble *O. boucardi*; in some adult specimens, on the contrary, the streaks are narrower and more numerous in the last whorl, these examples approaching *O. zoniferus.* In most specimens the streaks are not forked at their upper end; in some, however, a few streaks are forked, but in none is the forking so constant and conspicuous as it is in *O. princeps.* In a few examples one, two, or three narrow dark spiral bands are present on the fourth, or on the fourth and fifth whorls, the lowest of them in the suture. In some specimens the apex is of the same pale yellow as the three upper whorls; in others it is to a very small extent dark brown; in others, again, nearly the whole first whorl is dark. The coloration of the tip does not coincide with the more or less numerous streaks on the last whorl; but in the specimens with spiral bands the dark colour of the tip is rather more extended. The sculpture usually consists of spiral striæ only; but in several specimens numerous malleated impressions are also visible, sometimes in rows descending towards the aperture. The dimensions given above are taken from a most typical example of middle size; the largest specimen measures 58, 30, and 29 millim., but it is one of those which approach *O. zoniferus.* The var. *b* shows a prevalent dark coloration of the tip, the last whorl, and the aperture, together with a spiral band which is constantly present in the first half of the last whorl. The var. *c* may be termed an albino specimen, the brown colour being very pale in the streaks and in the callus of the aperture, and wanting altogether at the tip and on the external edge of the aperture.

In short, these twenty-two specimens prove that it is very difficult, or rather impossible, to trace clear and precise specific distinctions in this genus.

9. **Ortalichus longus.**

Bulimus zebra, var. *β*, Pfr. Monogr. Helic. Vivent. ii. p. 144 [1].

Orthalicus longus, Pfr. Malak. Blätt. iii. p. 187 (1856) [2]; Monogr. Helic. Vivent. iv. p. 589 [3]; v. Mart. in Malak. Blätt. xii. p. 39 (1865) [4]; Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 450, t. 18. fig. 4 [5]; Strebel, Beitr. Mex. Land- und Süssw.-Conch. v. p. 43, t. 6. figg. 1 *c*, *d* [6].

Hab. Central Mexico: State of Michoacan, especially at Ario (*Uhde* [4 6]); Cuernavaca in the State of Morelos (*Boucard* [5]); Mexico, without nearer indication of locality (*Hegewisch* [2 3 6]).

S. Mexico: State of Oaxaca (*Boucard* [5]).

10. **Ortalichus livens.**

Orthalicus livens (Beck), Shuttl. Notitiæ Malac. i. p. 64, t. 3. fig. 8 [1]; Pfr. Monogr. Helic. Vivent. iv. p. 589 [2]; Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 453, t. 18. figg. 6, 6 *a* [3].

Hab. E. Mexico: probably near Vera Cruz (*Sandoz* [1 2]).

Var. *uhdeanus*: strigis continuis, crebris.

Orthalicus livens (Shuttl.), v. Mart. in Malak. Blätt. xii. p. 38 (1865) [4]; Pfr. Monogr. Helic. Vivent. vi. p. 200, nota [5]; Strebel, Beitr. Mex. Land- und Süssw.-Conch. v. pp. 32, 33, t. 11. fig. 19 [6].

Hab. W. Mexico: West coast, State of Michoacan (*Uhde* [4–6]).

Among the large number of specimens of this genus which Strebel and I have examined, not one agrees satisfactorily with Shuttleworth's description and figure of *O. livens*; but as Fischer and Crosse [3] represent a very similar specimen, only of larger size, under the same name, it must be placed among the Mexican species until further information is obtained. *O. livens* seems to be characterized by the elongated form, and by the streaks being few in number and chiefly represented in the middle part of the last whorl, where they expand sometimes to broad blotches, attenuated or vanishing above and beneath, somewhat as in *O. princeps*. The West-Mexican specimens which I referred [4] to this species differ in the more numerous and equally continued streaks; they approach nearer to *O. longus*, but differ from that species in the sutures being less deep, which gives a more continuously conical appearance to the whole shell, instead of the graduated form of *O. longus*.

11. **Ortalichus ponderosus.** (Tab. XI. figg. 9, 10, 10 *a*.)

Orthalicus ponderosus, Strebel, Beitr. Mex. Land- und Süssw.-Conch. v. pp. 35, 36, t. 7. figg. 1, 5–8[1].

Orthalicus boucardi-ponderosus, Strebel, ibid. p. 39, t. 1. figg. 4 *a, b* (corrected on p. 132 to *ponderosus-boucardi*)[2].

Orthalicus lividus-princeps, Strebel, ibid. p. 31, t. 1. fig. 6[3].

Hab. W. Mexico: San Blas, State of Jalisco (*Wessel, in coll. Dunker*); Tepic (*Richardson*); West Mexico (*Wessel*[3]); Culata, near Manzanillo, State of Colima (*Lloyd*, June 1889); Dos Arroyos, 25 miles N.E. of Acapulco, State of Guerrero, at an elevation of 1000 feet above the sea (*H. H. Smith*).

S.W. Mexico: Tehuantepec (*Strebel*[2]).

Strebel[1] did not know the exact locality of the specimens which he described; but the collection of Dunker and the materials placed in my hands by Messrs. Godman and Salvin show that this remarkable species belongs to the western coast of Mexico, where it is somewhat widely distributed. In the Berlin Museum there is a shell much resembling this species received from Dr. H. Dohrn, and said to have been found at Juraty on the Amazon river. A similar shell is also stated to have been found in Colombia, in the holes of trees, by Wallis (see Mousson, Malak. Blätt. 1869, p. 179).

The apex is generally dark chestnut-brown, but in some apparently fresh specimens it is pale. The broad black lip inside the aperture is to be seen in young specimens measuring 43 millim. in length. The aperture is all round of a shining black, only the columellar edge itself is pinkish-white, with the base of the aperture black, the white forming a more or less narrow streak on the columella. The general colour of the shell is yellowish-brown; the dark streaks are more distinct on the upper whorls, confluent and often very indistinct on the last.

12. **Ortalichus melanochilus.** (Tab. XI. figg. 6, 7, 7 *a*.)

Bulimus melanochilus, Valenc. in Humboldt & Bonpland's Recueil. d'Observ. Zool. ii. p. 246, t. 55. figg. 3 *a, b* (1833)[1].

Orthalicus melanochilus (Valenc.), v. Mart. in Malak. Blätt. xii. pp. 45, 70 (1865)[2]; Binney & Bland, Terr. air-breath. Moll. N. Am. v. p. 410, fig. 287[3]; Man. of Am. Land-Shells, p. 440, fig. 484[4].

Bulimus zebra, var. E, Pfr. Monogr. Helic. Vivent. ii. p. 144[5].

Orthalicus zebra (Müll.), Carpenter, Cat. Mazatlan Shells, pp. 176, 177, Tabl. 805, 806[6]; Binney, Land and Freshw. Shells of N. Am. i. p. 217, fig. 371, p. 215, fig. 367 (jaw)[7].

Hab. N.W. Mexico: Tres Marias Islands (*Forrer, Richardson*); Mazatlan (*Reigen*[6]); Sierra Madre (? Tonalá in Jalisco *) (*Xantus*[7]).

Valenciennes[1] gives simply "Nouvelle Espagne," that is to say Mexico and Central

* Given as "Tomla Talasco."

America; his figure, although showing distinct bands, agrees better in its more elongated form with the N.W. Mexican species than with the Central-American *O. ferussaci*, var. *tricinctus*.

Pilsbry's *O. melanochilus*, var. *floridensis* (Proc. Ac. Phil. 1891, p. 317, with woodcut) is probably a dark-mouthed variety of *O. undatus*, Brug.

Doubtful Species of Ortalichus.

Orthalicus leucochilus, Crosse & Fisch. in Journ. de Conch. xvii. p. 423 (1859); Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 459, t. 18. figg. 7, 7 *a*; from Orizaba, E. Mexico, collected by Berendt, has much the appearance of an albino variety. Strebel does not know it. For a similar variety of *O. macluræ*, see *anteà*, p. 188.

Orthalicus zebra, Müll. (ex parte), or, more precisely, *O. undatus*, Brug., Férussac, Hist. Nat. Moll. Terr. et Fluv. t. 114. figg. 5, 6; Shuttl. Notitiæ Malac. p. 63, t. 3. figg. 4, 5; Binney, Terr. air-breath. Moll. N. Am. t. 54 (upper and lower figure); from Florida, Cuba, and Jamaica, is mentioned by Binney & Bland, Land and Freshw. Shells of N. Am. i. p. 218, as from Mazatlan, and at p. 219 of the same work, as from "Taboga, Mex." It is therefore admitted by Fischer & Crosse, Miss. Scient. Mex., Mollusca, i. p. 441, among the Mexican species. As neither these authors, nor Strebel or myself, have found this species amongst the numerous Mexican specimens of the genus which we have examined, I presume that the locality "Mazatlan" refers to a variety of *O. princeps*, and Taboga, if meant for the island of Taboga in the Bay of Panama, to *O. ferussaci*.

OTOSTOMUS.

Otostomus, Beck, Index Moll. p. 55 (part.) (1838)[1]; H. & A. Adams, Gen. Moll. ii. p. 149 (1858)[2]; v. Martens, Die Binnenmoll. Venezuela, p. 23 (1873) (relying on the jaw and radula)[3]; and Conch. Mittheil. ii. p. 191 (ditto)[4]; Semper, Reis. Archip. Philippin., Land-Moll. Heft 3, p. 154 (1874)[5].

Bulimulus, subgen. *Goniognathmus*, Fischer & Crosse, Miss. Scient. Mex., Mollusca, i. p. 473 (1875)[6].

Bulimulus, sectt. D–F, Strebel, Beitr. Mex. Land- und Süssw.-Conch. v. pp. 46–48[7].

Shell oblong, generally variegated, often with expanded aperture, more or less shining; columella somewhat twisted, not notched at the base. Jaw composed of numerous plates, with very oblique edges, converging towards the median line. Teeth of the radula in waved transverse rows; median tooth very short, generally with a lateral cusp on each side; marginal teeth generally tricuspid.

The name *Otostomus* was first proposed by Beck[1] for the group of the old genus *Bulimus* which contains *B. auris leporis*, subsequently extended by the brothers

Comparative Table of the Species of *Otostomus*.

Nomen.	Peristoma.	Figura.	Sculptura.	Coloratio.	Umbilicus.	Long.	Diam.	Apert.	Patria.
dombeyanus, *Pfr.*	late expansum, iteratum, pallidum.	acuminato-ovata.	verticaliter rugoso-plicata.	albida, interdum subfasciata, columella et fauce fusca.	late rimatus.	mm. 62 59	mm. 34 27	mm. 38 28	Central & W. Mexico.
——, var. alcantaræ, *Bern.*	late expansum, album.	,,	,,	alba, fauce fusca.	,,	62	38	39	Central Mexico.
fenestratus, *Pfr.*	late expansum.	oblongo-ovata.	rugoso-striata, submalleata.	albida, fasciis 5 violaceis subinterruptis.	,,	51	26	28	W. Mexico.
lilacinus, *Reeve*.....	late expansum, albidum, extus flavidum.	elongate ovata.	ruditer striata, ad suturam crenulata.	albida, fasciis 4–5 purpureo-fuscis sæpe interruptis.	latiuscule perforatus.	54 43	24 20	23 24	S.W. Guatemala.
——, var. undulosus, *v. Mart.*	,,	,,	,,	strigis undulosis, violaceis.	,,	42	20	23	W. Guatemala.
——, var. unicolor, *v. Mart.*	,,	,,	,,	albida, unicolor.	,,	43	21	23½	W. Guatemala.
——, var. crossei, *v. Mart.*	late expansum, albidum, extus albidum.	,,	,,	fasciis 3 angustis fuscis continuis.	,,	44½	21	24	N. Guatemala.
——, var. jansoni, *v. Mart.*	,,	,,	,,	carneo-albida, fasciis 4 interruptis.	,,	46	22	24	Nicaragua.
——, var. ictericus, *v. Mart.*	late expansum, albidum, extus flavidum.	,,	,,	flavida, unicolor.	,,	34	17	17	W. Guatemala.
zhorquinensis, *Ang.*.....	late expansum, albidum.	acuminato-ovata.	grossiuscule striata, sæpius decussata.	albida, strigis fuscis raris obliquis.	,,	48	24	25	S.E. Costa Rica.
josephus, *Ang.*	latiuscule expansum, albidum, columella dilatata.	,,	subtiliter striatula, solida.	albida, strigis fusco-olivaceis obliquis numerosis.	,,	32	17	15	Central Costa Rica.
——, var. maculosus, *v. Mart.*	,,	,,	,,	maculis fuscis subquadratis, 4-seriatis.	,,	37	17	18	S.W. Costa Rica.
——, var. concolor, *v. Mart.*	,,	,,	,,	pallide flava, unicolor.	,,	34	16½	16½	N.E. & S.W. Costa Rica.
serperastrum, *Say*	modice expansum, tenue.	elongate ovata.	sublævigata, nitida.	fasciis 5 approximatis, tessellatim interruptis, fusco-violaceis.	perforatus.	41 37 31	17 17½ 13	21 19 14½	Texas, E. Mexico, Yucatan.

delattrei, *Pfr.*	late expansum, columella violacea.	ovata.	subarcuatim malleata.	pallide lilacea vel straminea, strigis raris vel fasciis interruptis vel unicolor.	anguste perforatus.	47 40 36	24 23 19	27 26 19	N. & Central Guatemala, Nicaragua.
——, var. hiabundus, *v. Mart.*	,,	ovata vel anguste ovata.	leviter malleata.	alba, fasciis 3–5 latis fuscis, vel unicolor.	,,	32 30	17 15½	19 17	W. Guatemala.
chiapensis, *Pfr.*	breviter expansum, tenue.	anguste ovato-oblonga.	subtiliter decussata, nitidula, solida.	alba, unicolor.	latiusculus.	49 35	24 18	21	E., Central, & S. Mexico.
——, var. quadrifasciatus, *v. Mart.*	,,	,,	,,	alba, fasciis 4 fuscis continuis.	,,	45 39	19½ 19½	26 22	E. Mexico.
——, var. nebulosus, *v. Mart.*	,,	,,	,,	fusco-nebulosa, sutura alba.	,,	41	18	21	E. & Central Mexico.
castus, *Pfr.*	modice expansum, roseum.	conico-ovata.	obsolete decussata, nitida, tenuiuscula.	hyalino-albida, unicolor vel fasciis 2–3 vel strigis raris.	vix perforatus.	23 22 19	11 12 9	12½ 12 10	N. Guatemala (? Nicaragua).
——, var. xantholeucus, *v. Mart.*	modice expansum, flavescens.	ovata.	,,	alba, apice flavescens.	,,	25	14	15	N. Guatemala.
——, var. porrectus, *v. Mart.*	modice expansum, album vel roseum.	ovato-oblonga.	,,	alba, unicolor vel fasciis 2–3 vel strigis raris.	,,	35 30	15 14	19 18	N. Guatemala.
angasi, *Mart.* (gabbi, *Ang.*).	expansum, subincrassatum, roseum.	ovata.	leviter striatula, nitida, solida.	albescens vel rubescens, unicolor vel guttulis albis vel fasciis albo-guttatis.	nullus ?	23	12	12	N.E.&Central Costa Rica.
dunkeri, *Pfr.*	leviter expansum.	conico-ovata.	ruguloso-striata.	pallide fulva fusco-strigata, maculis pallidioribus.	perforatus.	38	19	18	Central & W. Mexico.
——, var. forreri, *Mouss.*	,,	subovata.	,,	pallide fulva, maculis fulvo-fuscis subquadratis.	,,	37	20½	20	N.W. & N. Mexico.
sulcosus, *Pfr.*	subexpansum, albo-labiatum.	elongate ovata.	sulcis undulatis irregularibus confertis.	carneo-albida, plerumque strigis maculisque fuscis.	,,	44 36 31	20 17½ 13½	22 19 17	Central & ? E. Mexico.
——, var. botterii, *Cr. & Fisch.*	,,	oblongo-ovata.	rugosa.	carneo-albida, fasciis obsoletis continuis.	,,	32	15	17	Central Mexico.
rudis, *Ant.*	rectum, albo-labiatum.	conico-ovata.	irregulariter striata, submalleata.	alba, parce fusco-variegata, varice fusco.	aperte perforatus.	34 30 23	17 14 13	19 15 14	Central Mexico.
ghiesbreghti, *Pfr.*.....	breviter expansum.	oblongo-ovata.	anfr. ult. leviter rugosa.	albida, strigis raris fuscis.	perforatus.	32 24 22	15 13 10	15½ 13 12½	S. Mexico.
——, var. stolli, *v. Mart.*	subsimplex.	ovato-oblonga.	anfr. ult. grosse rugosa.	alba, strigis fuscis latis raris.	,,	30 29½ 27	14 12 13	15 12 15	Central Guatemala.

COMPARATIVE TABLE OF THE SPECIES OF *OTOSTOMUS* (*continued*).

Nomen.	Peristoma.	Figura.	Sculptura.	Coloratio.	Umbilicus.	Long.	Diam.	Apert.	Patria.
						mm.	mm.	mm.	
ghiesbreghti, var. interstitialis, *v. Mart.*	columella alba.	ovato-oblonga.	anfr. ult. grosse rugosa.	albida, interstitiis rugarum læte fulvis.	perforatus.	32	17	17	Central Guatemala.
——, var. iodostylus, *Pfr.*	colum. lilacea.	,,	lævius rugosa.	albida, strigis castaneis irregularibus vel unicolor.	,,	30	12	15	S.W. Mexico.
hegewischi, *Pfr.*	rectum, simplex, colum. alba.	oblongo-ovata.	oblique rugosa, irregulariter spiratim striata.	,,	vix perforatus.	26	12	14	Central, W., & E. Mexico.
jonasi, *Pfr.*	leviter expansum, colum. violascente.	,,	rugoso-plicata.	alba vel straminea, interstitiis plicarum pellucidis.	perforatus.	28 26	11½ 10	12⅓ 12	Central & ? N. Guatemala, Costa Rica.
aurifluus, *Pfr.*	breviter expansum, tenue.	,,	decussata.	alba, strigis crebris rectis flavis.	vix rimatus.	23 22	13 10½	13 12	E. & S. Mexico.
recluzianus, *Pfr.*	simplex.	fusiformi-ovata.	sublævigata, tenuiter spiratim striata.	carnea, strigis castaneis et griseo-violaceis.	vix perforatus.	32 30	14 12	16 16	S. Mexico.
——, var. lineolatus, *Conr.*	,,	,,	,,	flavescens, strigis nigricantibus raris.	,,	20	11	10½	Central Costa Rica.
lirinus, *Morel.*	rectum, simplex, colum. torta.	fusiformi-oblonga.	ruguloso - striata, leviter decussata.	alba, unicolor.	,,	30	11	15½	N. Guatemala.
cucullus, *Morel.*	,,	succineiformis.	oblique rugoso-sulcata.	,,	nullus.	18 17	9 7½	9½ 9⅓	Yucatan.
fenestrellus, *v. Mart.* ...	leviter expansum.	oblongo-ovata.	,,	,,	perforatus.	29 25	15 13	15 -	Central Mexico.
attenuatus, *Pfr.*	breviter expansum, colum. torta, tenui.	fusiformi-oblonga.	striatula, nitida, subtiliter spiratim striata.	alba, strigis fuscis distantibus subinterruptis.	vix perforatus.	35 34 26	15 13 12	20 19 14	E. Mexico.
——, var. concolor, *v. Mart.*	,,	,,	,,	alba, unicolor.	,,	35 34 26	15 13 12	20 19 14	E. Mexico.
——, var. varicosus, *Pfr.*	latius expansum.	,,	,,	alba, strigis parcis rectis.	perforatus.	37 36	18 16	19 17	Mexico.
——, var. pittieri, *v. Mart.*	modice expansum, columella torta, tenui.	,,	leviter striatula, lineis spiralibus vix conspicuis.	flavida, strigis fuscis inter se remotis, continuis.	rimatus.	30	13	15	S.W. & Central Costa Rica.
trimarianus, *v. Mart.* ...	breviter expansum, colum. subrecta.	elongato-ovata.	leviter striatula, nitidula.	alba, subunicolor, subinde in anfr. penult. fasciis interruptis.	,,	32 27	14 12	14½ 12½	N.W. Mexico.

hepatostomus, *Pfr*	breviter expansum, columella torta, crassa.	oblongo-ovata.	anfr. ult. subrugosa.	albida, strigis raris rectis nigro-fuscis.	rimatus.	32 27	16 14	18 15	S. Mexico.
costaricensis, *Pfr.*	breviter expansum, tenue.	,,	striatula, subtiliter spiratim striata.	albida, strigis interruptis albo-striatis.	vix perforatus.	31½ 23	18½ 11	16 13–14	Central Costa Rica.
pluvialis, *Pfr.*	rectum, simplex, colum. obliqua.	conico-oblonga.	rugoso-striata.	albida, strigis rufis linearibus.	rimatus.	23	12	11½	Costa Rica.
bugabensis, *v. Mart.* ...	leviter expansum, colum. torta.	anguste ovata.	leviter striatula, nitida.	flava, strigis nigris latiusculis flexuosis.	vix perforatus.	27	11	14	S. Panama.
sargi, *Cr. & Fisch.*	rectum, simplex.	,,	sublævis, nitida.	alba, strigis nigris sæpius concatenatis.	,,	22	10	12	N. Guatemala.
——, var. motaguæ, *v. Mart.*	,,	,,	,,	alba, strigis discretis rectis.	,,	21½ 19	8½	11	Central Guatemala.
droueti, *Pfr.*	breviter expansum, tenue.	conico-ovata.	sublævis, oleoso-nitens.	flavida, strigis fasciisque vel maculis fuscis.	rimatus.	22½ 18	11 10½	11 10½	E. Mexico.
inglorius, *Reeve*	rectum, simplex.	,,	plicatulo - striata, striis spiralibus subtilibus.	albido-ochracea, strigis latis fusco - nigris sæpe albo-guttulatis.	,,	32 27 24	14½ 14½ 12	17½ 15 13	S. Mexico.
——, var. heynemanni, *Pfr.*	,,	,,	,,	strigis latioribus, magis numerosis.	vix rimatus.	29 24	14 13	14 13	E., Central, & S. Mexico.
maculatus, *Lea*.....	levissime expansum.	oblongo-conica.	striatula, spiratim striata.	albida, maculis fuscis parvis, fasciatim seriatis.	perforatus.	26	10½	11½	N. & W. Guatemala, Central Nicaragua, Costa Rica, S. Panama, Colombia, E. Peru.
totonacus, *Streb.*	,,	oblongo-ovata.	striatula, spiratim striata.	diaphano-albida, maculis castaneis parcis, quadriseriatis.	,,	34 28 24	17 14 12	16 14 12	E. Mexico.
championi, *v. Mart.* ...	,,	conico-ovata.	confertim spiratim striata.	diaphano-albida, fascia subsuturali et maculis obsoletis fuscis.	,,	27	14½	13	W. Guatemala.
emeus, *Say*	vix expansum.	elongato-ovata.	,,	lactea vel straminea, fasciis 5 pallide fuscis plus minusve interruptis.	,,	31	15	14½	E. & S.E. Mexico.
——, var. hypozonus, *v. Mart.*	rectum.	,,	,,	flavida, basi fasciis 1–2 fuscis.	,,	26	13	12	E. Mexico.
——, var. albivaricosus, *v. Mart.*	,,	,,	,,	diaphana, strigis raris albis.	,,	18	8	8½	E. Mexico.
——, var. membranaceus, *Phil.*	leviter expansum.	subconico-oblonga.	,,	diaphano-albida, unicolor.	,,	33	15	16	E. & ? W. Mexico.
irazuensis, *Ang.*	simplex, rectum, roseum.	subovata.	irregulariter malleato-striata.	pallido - flava, strigis nigris confluentibus, interdum fasciis latis sæpe pallide guttatis.	rimatus.	24 22	12 11	12 12	Central Costa Rica.

Comparative Table of the Species of *Otostomus* (*continued*).

Nomen.	Peristoma.	Figura.	Sculptura.	Coloratio.	Umbilicus.	Long.	Diam.	Apert.	Patria.
tripictus, *Alb.*	simplex, rectum, roseum.	ovata.	striatula, tenuis.	pallide flava, maculis sagittatis fuscis triseriatis ; apex roseus.	perforatus.	mm. 23 20	mm. 15½ 13	mm. 15 12	Costa Rica.
——, var. hoffmanni, *v. Mart.*	,,	anguste ovata.	,,	pallide flava, fasciis 3 fuscis, media reticulata ; apex pallidus.	,,	19	9½	10½	Central & S.W. Costa Rica.
sulfureus, *Pfr.*	levissime expansum.	elongato-ovata.	spiratim subtiliter striata, nitidula.	flava, unicolor.	minute perforatus.	29 28	15 14	14 13	Central, E., & S.E. Mexico, N. Guatemala, Nicaragua.
——, var. albidus, *v. Mart.*	,,	,,	,,	albida, unicolor.	,,	...	...	...	E. & S.E. Mexico, N. Guatemala.
——, var. gracilior, *v. Mart.*	,,	ovato-fusiformis.	,,	sulfurea, unicolor.	,,	29 28 21	12 10 9	13 11 9½	N., W., & S.W. Guatemala, Nicaragua.
——, var. citronellus, *Ang.*	subrectum.	conico-ovata.	,,	flava, sutura alba.	,,	27 25	13 12	12 11½	N.E.,Central,S.W., & S.E.Costa Rica.
——, var. obesus, *v. Mart.*	,,	,,	,,	albida, unicolor.	,,	26	14	13	E. Mexico.
moricandi, *Pfr.*	simplex, rectum.	conico-ovata, macrostoma.	,,	citrina, sutura pallida.	perforatus.	25 24	13 12	13 13	N. Guatemala.
——, var. hyalino-albidus, *v. Mart.*	,,	,,	,,	diaphano-albida.	,,	25 24	13 12	13 13	S. Mexico, Yucatan, E. Guatemala.
moritinctus, *v. Mart.* ...	simplex, rectum, purpurascens.	oblongo-ovata.	irregulariter striatula, nitida.	isabellino-albida, fascia fusco-nigra una et punctis nigris sparsis.	rimatus.	29 26	13	15 14	W. Mexico.
livescens, *Pfr.*	rectum, simplex.	ovato-turrita.	lævigata.	livescenti-albida, fasciis fuscidulis 2–4 angustis vel subunicolor.	vix perforatus.	27 23	10 9	11 10	Central & W. Mexico.
discrepans, *Sow.*	,,	oblongo-conica.	,,	fulvescenti-alba, strigis fuscis angustis obliquis parcis et basi fasciis spiralibus 2 fuscis.	,,	20 16	10⅓ 8	9 7	Central & E. Guatemala, Salvador, Central Nicaragua, N.W. Costa Rica.
alternans, *Beck*	,,	subovata.	lævigata, nitidula.	albida, fasciis fuscis 5 latiusculis æqualibus.	perforatus.	23 21	14 10	13 11	N. & Central Guatemala, Central Costa Rica, S. Panama.

——, var. juquilensis, *v. Mart.*	rectum, simplex.	ovato-oblonga.	lævigata, nitidula.	albida, fasciis angustioribus.	perforatus.	23 19½	11 9½	10	S. Mexico, N. Guatemala.
honduranus, *Pfr.*	,,	ovato-conica.	,,	flavescenti-albida, fasciis 3–4 et regione umbilicali fusco-roseis.	,,	30 18½	14½ 10	13½ 9	Honduras.
tryoni, *Fisch. & Cr.*	levissime expansum, tenue.	,,	leviter striatula.	albida, fasciis 3–4 fuscis.	,,	27½	13	14	N.W. Mexico.
——, var. pochutlensis, *Fisch. & Cr.*	,,	oblongo-ovata.	,,	fasciis ochraceo vel albo limbatis.	,,	24	11½	11½	W. Mexico.
tropicalis, *Morel.*	,,	*sinistralis*, attenuato-subconica.	lævigata, nitidula.	alba, fasciis 3 rufo-fuscis; apex fusculus.	,,	28 26	11 11	11½ 11	Yucatan.
uhdeanus, *Mart.*	rectum, subincrassatum.	elongato-ovata.	grossiuscule striata, lineis spiralibus subtilissimis.	albida, fasciis latis pallide fuscis interruptis, vel subunicolor.	rimatus.	22 30	10 14	10 15	E. & W. Mexico.
——, var. cuernavacensis, *Cr. & Fisch.*	,,	,,	,,	flavida, fasciis fuscis latiusculis subinterruptis.	,,	29 22	15 10	13 10½	Central & E. Mexico.
——, var. tepicensis, *v. Mart.*	,,	,,	,,	anfr. ult. pallido, basi unifasciato.	,,	18	9	8½	W. Mexico.
——, var. borealis, *v. Mart.*	,,	,,	,,	maculata et basi late unifasciata.	,,	15	8	7	N.W. Mexico.
multilineatus, *Say*	,,	,,	lævigata, solidiuscula.	alba, apice hyalino, strigis castaneis.	obtecte perforatus.	25 20	12 8½	12 9	Florida, Yucatan, Colombia, Venezuela.
heterogeneus, *Pfr.*	rectum, simplex.	ovato-turrita.	læviuscula.	isabellino-albida, strigis pallidis distantibus.	anguste perforatus.	17	8½	7	E. & W. Mexico.
semipellucidus, *Tristr.*...	rectum, simplex, tenue.	subconico-ovata.	striatula.	pellucide albida, strigis opace albis, obliquis.	nullus.	18 14	8½ 7	6 6½	Guatemala, N.W., N.E., & Central Costa Rica.
panamensis, *Brod.*	rectum, simplex.	conico-ovata.	lævigata, tenuis.	pallide rubenti-fulva, unicolor vel substrigata.	,,	25 22	13 11	11 11	S. Panama.

Doubtful Species.

dominicus, *Reeve*	rectum, simplex.	conico-ovata.	striatula, levissime spiratim striata.	pallide cornea, diaphana, fascia fusca interrupta.	subobtectus.	19 16	10½ 8	10 8½	S.E. Mexico.
albostriatus, *Streb.*	,,	elongato-ovata.	,,	cornea, albido-striolata, strigis paucis fulvis.	,,	14	6	6	S.W. Mexico.
hachensis, *Reeve*	rectum, simplex, marg. colum. late reflexo.	conico-turrita.	sublævigata.	roseo-flava, unicolor.	,,	29 27	12 10½	10 10	? Guatemala, ? Colombia.

H. and A. Adams [2] to include a larger number of American species. The structure of the jaw and radula was used by myself in 1873 [3] as a distinctive character by which to separate *Otostomus* from *Bulimulus*, and afterwards [4] I gave a list of the species. Fischer and Crosse, two years later [6], established essentially the same division, based on the same characters, under a new name.

The great majority of the Mexican and Central-American species which have been described formerly as belonging to the old genus *Bulimus* appertain to this division, and also a large number of South-American species, as well as some Caribbean ones. They have been distributed among several subgenera by Albers and by H. and A. Adams, but it is very difficult to fix the limits of them: if one relies on such distinctive characters of the shell as can be indicated by a few words, very dissimilar shells will be included in one subgenus; and if one groups together the species which are linked one to the other by gradual affinities and general resemblance of the whole aspect, it is almost impossible to give precise characters for such groups.

The Mexican and Central-American species can be arranged in groups as follows:—

a. Rather large species, with sculptured shell and coloured, broadly expanded aperture.	*dombeyanus, fenestratus, lilacinus, zhorquinensis.*
b. Elongated, nearly smooth, with broadly expanded aperture	*josephus, serperastrum.*
c. More or less oval, nearly smooth, with large, broadly expanded aperture.	*delattrei, chiapensis, castus, angasi.*
d. Elongated or oval, longitudinally wrinkled or striated, with narrowly expanded aperture.	*dunkeri, sulcosus, rudis, ghiesbreghti, hegewischi, jonasi, lirinus, cucullus.*
e. Similar to the preceding in form and general appearance, but smooth	*aurifluus, recluzianus.*
f. Oblong or elongated, nearly smooth, variegated with dark spots, more or less shining; aperture narrowly expanded.	*fenestrellus, attenuatus, trimarianus, hepatostomus, costaricensis, pluvialis, bugabensis, sargi, droueti, inglorius.*
g. Oblong, variegated with spiral rows of spots or pale bands; aperture straight or very slightly expanded.	*maculatus, totonacus, championi, emeus,* ? *dominicus.*
h. Oval, with reticulated spiral bands and straight coloured aperture	*irazuensis, tripictus.*
i. Oblong or elongated, conspicuously spirally striated, unicolorous, yellow or white; aperture straight or slightly expanded	*sulfureus, moricandi.*
k. Oblong, smooth, variegated; aperture straight.	
aa. With spiral bands	*moritinctus, livescens, discrepans, alternans, honduranus, tryoni, tropicalis, uhdeanus.*
bb. With longitudinal streaks, sometimes obsolete .	*multilineatus, heterogeneus, semipellucidus, panamensis.*

Concerning the names of subgenera which have been proposed by former authors:—

Drymæus, Albers, Die Helic. ed. 1, p. 155, "testa rugoso-striata," may be applied to our group *a*. In the second edition of Albers's work it contains many other species.

Mesembrinus, Albers, Die Helic. ed. 2, p. 214, type *virgulatus*, Férussac, coincides to our group *k*.

Mormus, Albers, loc. cit. p. 216, type *papyraceus*, Mawe, can be applied to *f*.

Scutalus, Albers, contains, both in the first and second editions of Albers's work, somewhat different species; but reduced to the more characteristic species named in both editions, as *proteus*, *mutabilis*, and *versicolor*, it contains chiefly Peruvian species, and can be perhaps applied to our group *d*.

Otostomus, s. str., and *Liostracus*, Albers, belong to Brazilian groups which are not represented within our limits.

Thaumastus, Albers, is to be limited to *Bulimus hartwegi*, Pfr., from Ecuador.

1. **Otostomus dombeyanus.** (Tab. XII. figg. 2, 2 *a*.)

Helix dombeyana, Férussac, in Mus. Paris [1]; Pfr. Symb. Hist. Helic. ii. p. 76 (1842) (without description) [2].

Bulimus dombeyanus, Pfr. Symb. Hist. Helic. ii. p. 114 (1842) [3], iii. p. 83 (1846) (first description of the shell) [4]; Monogr. Helic. Vivent. ii. p. 57 [5], vi. p. 38 [6]; Reeve, Conch. Icon. v., *Bulimus*, t. 30. fig. 186 [7].

Bulimus (*Drymæus*) *dombeyanus*, Pfr. in Malak. Blätt. ii. p. 151 (1855) [8].

Bulimulus (*Otostomus*) *dombeyanus*, v. Mart. in Albers's Die Helic. ed. 2, p. 211 [9]; Malak. Blätt. xii. p. 23 (1865) [10].

Bulimulus (*Scutalus*) *dombeyanus*, Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 515 [11].

Lymnæa rugosa, Valenc. in Humboldt & Bonpland's Obs. Zool. ii. p. 250, t. 56. fig. 5 (young) (1833) [12].

Var. *alcantaræ*: peristomate albo.

Bulimus alcantaræ, Bernardi, Journ. de Conch. iv. p. 35, t. 3. fig. 1 (1853) [13]; Pfr. Monogr. Helic. Vivent. iv. p. 393 [14].

Bulimulus dombeyanus, var. *β*, Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 516 [15].

Bulimulus dombeyanus, Strebel, Beitr. Mex. Land- und Süssw.-Conch. v. p. 74, t. 7. figg. 3 *a*, *b* [16].

Hab. Central Mexico: On the slope of the hill Ajusco, near the city of Mexico (*Hahn* [16], var.).

W. Mexico: Venta de Zopilote, State of Guerrero (*H. H. Smith*, only a young shell).

Mexico, without nearer indication of locality (*Bonpland* [12], *Cuming* [7], *Berendt* [6]).

Of three full-grown specimens before me, two exhibit the prominent edge of a former lip on the back of the last whorl, one-third or one-half of the circumference backwards from the aperture. The colour of the peristome varies in these specimens from very pale brown to white, which proves that *O. alcantaræ* can scarcely be distinguished even as a variety; Strebel [16] came to the same conclusion. The interior of the aperture is also, in the variety, brownish. The young specimen from Venta de Zopilote (Tab. XII. figg. 2, 2 *a*) has a pale brown band immediately below the angular periphery, as in the figure given by Valenciennes [12].

It is a curious fact that previous to the year 1882 no exact locality was known for this very remarkable shell, the largest of the Mexican species of this genus. It seems that in the Paris Museum it has been mixed with shells collected by Mr. Dombey in Peru or rather Chili: see Lamarck, Hist. Nat. des Anim. sans Vert. ed. 1, vi. p. 141, *Auricula* (*Chilina*) *dombeyana*, and ibid. p. 76, *Helix peruviana*, identical with *laxata*, Fér., which both inhabit Chili and not Peru; hence the name "*dombeyanus*," and the erroneous indication of Peru as habitat [1 2 4 5]. Bernardi's assertion [13] that his specimen came from the Solomon Islands is still less trustworthy.

The name *alcantaræ* was given in honour of the then Prince-Royal of Portugal, Dom Pedro de Alcantara, afterwards king (1861).

Radula examined by myself.

2. **Otostomus fenestratus.** (Tab. XII. figg. 1, 1 *a*, *b*.)

Bulimus fenestratus, Pfr. P. Z. S. 1846, p. 29 [1]; Monogr. Helic. Vivent. ii. p. 101 [2]; Reeve, Conch. Icon. v., *Bulimus*, t. 36. fig. 214 [3].

Orthalicus (*Mesembrinus*) *fenestratus*, H. & A. Adams, Gen. Moll. ii. p. 157 [4].

Bulimulus (*Scutalus*) *fenestratus*, Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 528 [5].

Bulimulus (*Otostomus*) *piescheli*, v. Mart. in Monatsb. Akad. Wiss. Berl. 1863, p. 541 [6]; Malak. Blätt. xii. p. 22, t. 1. fig. 10 (1865) [7].

Bulimus piescheli, Pfr. Monogr. Helic. Vivent. vi. p. 38 [8].

Bulimulus (*Scutalus*) *piescheli*, Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 509 [9].

Bulimulus piescheli, Strebel, Beitr. Mex. Land- und Süssw.-Conch. v. p. 77 [10].

Hab. W. Mexico: Manzanillo near Colima (*Pieschel* [5–8 10]).

Mexico, without nearer indication of locality [1] (*Liebmann*? [2–5]).

This species is somewhat intermediate between *O. dombeyanus* and *O. lilacinus*, but is nearer to the latter, from which it differs chiefly in the much rougher, wrinkled, and malleated sculpture. The apex is unicolorous white with a reddish hue, and smooth; the bands commence on the third whorl, and only three are visible on all whorls except the last, the two others being concealed by the following whorl. The sculpture consists of broad raised wrinkles, most of which are covered by much finer undulated lines.

I have seen only one specimen (Tab. XII. fig. 1), collected at the above-mentioned locality and given to the Berlin Museum by Herr Pieschel, once Secretary of the Prussian Embassy to Mexico. From Reeve's figure [3] it is evident that the original specimen of Pfeiffer's *Bulimus fenestratus* in Cuming's collection belongs to the same species; but in the German collections this name has been applied by Philippi to another species, in which the light intervals between the dark bands and streaks have not the appearance of bow- or bay-windows, but the interrupted brown bands themselves represent square windows.

Pfeiffer himself seems to have confounded afterwards his own species with another, figured by Philippi as "*B. fenestratus*" (see *O. dunkeri*, p. 207), as the specimen from

Pfeiffer's collection described and figured by Strebel, Beitr. Mex. Land- und Süssw.-Conch. v. p. 75, t. 6. fig. 19, evidently belongs to the latter; therefore neither the name of Liebmann as collector, which is not mentioned by Pfeiffer in the first description [1], nor its position in the subgenus *Drymæus*, close to *B. dunkeri* (Pfeiffer, Malak. Blätt. 1855, p. 151), can be safely quoted for this species.

3. **Otostomus lilacinus.** (Tab. XII. figg. 3–6.)

Bulimus lilacinus, Reeve, Conch. Icon. v., *Bulimus*, t. 74. fig. 532 (1849) (young specimen) [1]; Pfr. Monogr. Helic. Vivent. iii. p. 326 [2].

Bulimus (*Drymæus*) *lilacinus*, Pfr. in Malak. Blätt. ii. p. 151 (1855) [3].

Otostomus (*Hamadryas*) *lilacinus*, H. & A. Adams, Gen. Moll. ii. p. 150 [4].

Bulimulus (*Drymæus*) *lilacinus*, Albers, Die Helic. ed. 2, p. 211 [5]; Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 479, t. 20. figg. 1, 2, t. 24. figg. 5, 5 *a* [6].

Otostomus (*Drymæus*) *lilacinus*, v. Mart. Conch. Mittheil. ii. p. 191 [7].

Bulimus patricius, Reeve, Conch. Icon. v., *Bulimus*, t. 81. fig. 600 (Dec. 1849) [8].

a. *typica*: fasciis 4–5 purpureo-fuscis, striolatis, sæpius interruptis, fauce violacea, peristomate extus flavido. (Reeve, fig. 600; Fisch. & Crosse, t. 20. figg. 1, 2.)

Hab. S.W. GUATEMALA: San Agustin, department of Solola (*Bocourt* [6]); same locality, at an elevation of 3000 feet above the sea (*Stoll*).

b. *undulosus*: pallide violascens, strigis undulosis violaceis, fauce violacea, peristomate extus flavido. (Fig. 4.)

Hab. W. GUATEMALA: Hacienda de las Nubes, Cerro Zunil, Pacific slope, 4000 feet (*Champion*).

c. *unicolor*: albidus, columella sola violacea, peristomate extus flavido. (Fig. 6.)

Bulimulus (*Drymæus*) *lilacinus*, var. *β*, Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 479 [9].

Bulimulus delattrei, schlanke Lokalform, Stoll, Guatem. Reisen, p. 198 (1886) [10].

Hab. W. GUATEMALA: Cholhuitz (*Stoll* [10]); Cerro Zunil 4000 feet, El Reposo 1000 feet (*Champion*); Hacienda Buenavista and Hacienda Helvetia, in virgin forest, at an elevation of from 3000 to 4000 feet, descending in some localities to about 2000 feet (*Stoll*); Cuesta between Antigua and Escuintla (*Stoll*).

d. *crossei*: albidus, fasciis 3 angustioribus fuscis continuis, peristomate extus albido.

Bulimulus (*Drymæus*) *lilacinus*, var. *γ*, Fisch. & Crosse, loc. cit. p. 479, t. 24. figg. 5, 5 *a* [11].

Hab. N. GUATEMALA: Alta Vera Paz (*Sarg* [11]).

e. *jansoni*: carneo-albidus, fasciis 4 fusco-violaceis interruptis, strigisque nonnullis angustioribus, peristomate extus albido, fauce rosea. (Figg. 3, 3 *a*, *b*.)

Long. 46, diam. 22, apert. 24 millim.

Hab. NICARAGUA (*Janson*).

f. *ictericus*: gracilior, unicolor flavidus, columella sola violacea. (Fig. 5.)

Hab. W. Guatemala: Cerro Zunil (*Champion*).

According to the MS. notes of Dr. O. Stoll, this species, and especially the var. *unicolor*, is characteristic of the forests of the western or Pacific slope of the Guatemalan Cordillera, at an elevation of between 3000 and 4000 feet above the sea, descending in some localities nearly to 2000 feet. The specimen collected by Mr. Champion at El Reposo in the lowlands between Retalhuleu and the Pacific coast is remarkably small, attaining only $36\frac{1}{2}$ millim. in length; it exhibits, nevertheless, the remains of an older expanded aperture (such as is often to be seen in *O. dombeyanus*) at the back of the last whorl, which corresponds to a length of 30 millim. This early building of an aperture, as if it were adult, seems to indicate a longer interruption or slowness of growth, caused by unfavourable conditions of the locality.

The var. *d*, which I know only from the description and figure of Fischer and Crosse [11], closely resembles, at first sight, *O. chiapensis*.

Jaw and radula of var. *jansoni* examined by myself.

4. **Otostomus zhorquinensis.**

Bulimus zhorquinensis, Angas, P. Z. S. 1879, p. 478, t. 40. fig. 4 [1].

Hab. S.E. Costa Rica: Middle Zhorquin to Cuabre, on low hills and flat ground (*Gabb* [1]).

Angas compares this species with *Bulimus expansus*, Pfr., *B. pallidior*, Sow., *B. excelsus*, A. Gould, and *B. lilacinus*, Reeve. I have not seen a specimen of it.

5. **Otostomus josephus.** (Tab. XII. figg. 7–10.)

Bulimus josephus, Angas, P. Z. S. 1878, p. 73, t. 5. figg. 13, 14 [1], 1879, p. 478 [2].

Hab. Central Costa Rica: San José, on the trunks of Acacia trees (*Boucard* [1]); Talamanca, on the lower hills (*Gabb* [2]).

b. *maculosus*: maculis fuscis subquadratis 4-seriatis. (Fig. 7.)

Hab. S.W. Costa Rica: on the banks of Rio Pacuare del Sur in its middle course, about 500 metres above the sea (*Pittier*).

c. *concolor*: pallide flavescens. (Figg. 8–10.)

Hab. N.E. Costa Rica: Puerto Viejo, on the Rio Sarapiqui (*Biolley*).

S.W. Costa Rica: valley of the Upper Savegal, at an elevation of 1000 metres above the sea, and in the woods near Terraba; Quebrada de Tocori in the valley of the Rio Paqueta, and El Pital in the valley of the Rio Naranjo (*Pittier*).

This species is remarkable for the broadly expanded columellar margin, which ascends perpendicularly and forms a distinct angle with the convexity of the penulti-

mate whorl. I have seen only a few specimens belonging to the vars. *b* and *c*, all collected by H. Pittier and P. Biolley.

6. Otostomus serperastrum.

Bulimus serperastrus, Say, New Harmony Disseminator, Jan. 1, 1829, p. 25 (ed. Binney, p. 30) [1]; Pfr. Monogr. Helic. Vivent. ii. p. 102 [2], iii. p. 341 [3]; and in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, *Bulimus*, p. 82, t. 32. figg. 1, 2, t. 39. fig. 5 [4]; Reeve, Conch. Icon. v., *Bulimus*, t. 40. fig. 252 [5]; Philippi, Abbild. neuer Conch. iii. p. 97, *Bulimus*, t. 9. fig. 6 [6]; Binney, Terr. air-breath. Moll. N. Am. ii. p. 274, t. 50. fig. 2 [7], and iv. p. 126 [8].

Bulimus (*Drymæus*) *serperastrus*, Pfr. in Malak. Blätt. ii. p. 152 (1855) [9].

Bulimulus (*Drymæus*) *serperastrus*, v. Mart. in Albers's Die Helic. ed. 2, p. 212 [10]; Binney & Bland, Land and Fresh-water Shells of N. Am. i. p. 192, figg. 334, 335 (the latter copied from a drawing by Mr. Say) [11]; Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 488, t. 24. fig. 4 (copied from Say's drawing) [12].

Drymæus serperastrus, Tryon, in Am. Journ. Conch. iii. p. 167, t. 9. (13) fig. 4 [13].

Bulimulus serperastrus, Strebel, Beitr. Mex. Land- und Süssw.-Conch. v. p. 83, t. 6. fig. 12 [14].

Bulimus liebmanni, Pfr. in Zeitschr. für Malak. 1846, p. 158 [15]; Monogr. Helic. Vivent. ii. p. 106 [16]; Reeve, Conch. Icon. v., *Bulimus*, t. 70. fig. 506 (errore *ziebmanni*) [17].

Bulimus (*Mesembrinus*) *liebmanni*, Albers, Die Helic. ed. 1, p. 157 [18].

Orthalicus (*Mesembrinus*) *liebmanni*, H. & A. Adams, Gen. Moll. ii. p. 157 [19].

Bulimus nitelinus, Reeve, Conch. Icon. v., *Bulimus*, t. 59. fig. 398 (young specimen) [20].

Bulimus paivanus, Pfr. in Malak. Blätt. xiii. p. 81 (1866) [21]; Novit. Conch. iii. p. 309, t. 75. figg. 4, 5 [22]; Monogr. Helic. Vivent. vi. p. 35 [23].

Bulimulus (*Drymæus*) *paivanus*, Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 490, t. 21. figg. 1, 1 *a* [24].

Bulimulus paivanus, Strebel, Beitr. Mex. Land- und Süssw.-Conch. v. p. 82, t. 6. fig. 11, t. 12. fig. 18, t. 13. fig. 12 (radula), t. 14. figg. 9 G (genit. appar.), 10 A, B, D, 11, t. 16. fig. 3 (jaw) [25].

Otostomus paivanus, v. Mart. Conch. Mittheil. ii. p. 192 [26].

Hab. North America: Texas [11].

E. Mexico: on the road between Vera Cruz and Mexico [1]; Jalapa (*Höge*, *M. Trujillo*); Almolonga, near Jalapa (*Höge*); Cordova (*Höge*; one young specimen); Tierra Colorada, between Jalapa and Vera Cruz (*Doña Estefania* [25]); Paso de San Juan and Loma de Piedra on the Rio Jamapa, near Vera Cruz (*Strebel* [25]); between Paso de Ovejas and the plantation of Mirador (*Strebel* [25]); Bobo, near the Port of Vera Cruz (*Höge*); Vera Cruz, in the littoral region (*Berendt* [21–24]).

Yucatan: Sisal (*Morelet* [12]).

According to Strebel [25], this species lives in the Savanas on high grasses; Herr Höge, on the contrary, has found it in dense forest, free from underwood, at Bobo.

As in *O. lilacinus*, an older lip is formed accidentally on the back of the last whorl in some specimens.

The word "*serperastrum*" in Latin means a kind of basket-work for children, and

it may have been applied to this species owing to the basket-like appearance of the bands and spots: "serperastrus" is not a Latin word.

Note.—*Bulimus californicus*, Reeve, Conch. Icon. v., *Bulimus*, t. 56. fig. 378, which has not been found in California by later collectors (*cf.* Binney & Bland, Terr. air-breath. Moll. N. Am. v. p. 21; Manual Am. Land-Shells, p. 22), is perhaps a non-adult specimen of a slender form of *O. serperastrum*.

Otostomus hygrohylæus (Orb.), from Bolivia, is very similar to this species; but may be distinguished from it by the more broadly dilated, projecting part of the peristome, the more irregular, coarse, wrinkle-like striæ, and the bands being interrupted into arrow-like spots.

7. **Otostomus delattrei.** (Tab. XII. figg. 11–14.)

Bulimus lattrei, Pfr. in Philippi's Abbild. neuer Conch. ii. p. 112, t. 4. fig. 11 (1846) [1]; Monogr. Helic. Viv. ii. p. 56 [2]; Deshayes, in Férussac's Hist. Nat. Moll. Terr. ii. 2, p. 48, t. 111. figg. 12, 13, t. 149. figg. 12, 13 [3].

Bulimus (*Gonyostomus*) *lattrei*, Albers, Die Helic. ed. 1, p. 150 [4].

Bulimus (*Eurytus*) *lattrei*, v. Mart. in Albers's Die Helic. ed. 2, p. 195 [5].

Bulimus (*Drymæus*) *lattrei*, Pfr. in Malak. Blätt. ii. p. 151 (1855) [6].

Otostomus (*Goniostomus*) *lattrei*, H. & A. Adams, Gen. Moll. ii. p. 151 [7].

Bulimulus (*Drymæus*) *delattrei*, Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 481, t. 20. figg. 3 (living anim.), 4, t. 22. figg. 1–14 (jaw, radula, anatomy) [8].

Otostomus (*Drymæus*) *delattrei*, v. Mart. Conch. Mittheil. ii. p. 191 [9].

Bulimus focillatus, Reeve, Conch. Icon. v., *Bulimus*, t. 36. fig. 211 (1848) [10].

Bulimus pazianus, Tristr. P. Z. S. 1861, p. 230 (nec Pfr., nec Orbigny) [11].

A. *normalis*: sculptura validiore, apertura circa $\frac{4}{7}$ longitudinis occupante, major (long. circa 40 millim.).

a. Pallide lilacea, strigis angustis paucis fuscescentibus.

(Pfr. Monogr. Helic. Vivent. ii. p. 56, form *a*; Reeve, loc. cit. fig. 211 *c*; Deshayes, loc. cit. p. 48, troisième variété.)

Hab. N. Guatemala: Vera Paz (*errore* Vera Cruz) [2]; Coban (*Salvin* [11], *Bocourt* [8]).
Central Guatemala: Department of Salama (*Morelet* [8]); San Gerónimo near Salama (*Champion*).

b. Pallide lilacea, fasciis interruptis cærulescentibus. (Fig. 11.)

(Pfr. Monogr. Helic. Vivent. ii. p. 56, form β, and in Philippi, loc. cit. fig. prior; Reeve, loc. cit. fig. 211 *b*; Deshayes, loc. cit. t. 111. figg. 12, 13; Fisch. & Crosse, loc. cit. p. 481.)

Hab. North Guatemala: Vera Paz (*Delattre* [1 2]).
Central Guatemala: San Gerónimo (*Champion*).

c. Unicolor straminea vel albida, apertura concolore, columella violacea. (Fig. 12.)

(Pfr. Monogr, Helic. Vivent. ii. p. 56, form γ, and in Philippi, loc. cit. fig. altera; Reeve, loc. cit. fig. 211 *a*; Deshayes, loc. cit. t. 149. figg. 12, 13.)

Hab. North Guatemala: Vera Paz (*Delattre* [1 2]); Coban (*Salvin* [11], *Bocourt* [8], *Conradt*).
Nicaragua (*Janson*).

B. *hiabundus*: lævior, apertura circa $\frac{3}{5}$ longitudinis occupante, minor (long. circa 30 milim.).
d. Alba, fasciis 3–5 latis violaceo-fuscis. (Fig. 13.)
e. Unicolor alba. (Fig. 14.)

Hab. W. Guatemala: Cerro Zunil (*Champion*).

Bocourt states [8] that this species lives in wet places, on large herbs.
In some specimens the last whorl is slightly angulated in the middle (fig. 12).

8. **Otostomus chiapensis.** (Tab. XII. fig. 15, var.)

Bulimus chiapasensis, Pfr. in Malak. Blätt. xiii. p. 81 (1866) [1]; Monogr. Helic. Vivent. vi. p. 42 [2]; Novit. Conch. iii. p. 417, t. 95. figg. 3–6 [3].
Bulimulus* (*Drymæus*) *chiapasensis, Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 483 [4].
Bulimulus chiapasensis, Strebel, Beitr. Mex. Land- und Süssw.-Conch. v. pp. 70–73, t. 5. figg. 14 *a*, *b*, *c*, t. 6. figg. 13, 15, 16, t. 12. figg. 19 *a*, *b*, *c* [5].
Bulimulus* (*Drymæus*) *delattrei, varr. δ, ϵ, Fisch. & Crosse, loc. cit. t. 20. figg. 5, 6 [6].

a. *typicus*: albus, unicolor.
(Pfr. Novit. Conch. figg. 5, 6; Fisch. & Crosse, loc. cit. fig. 6; Strebel, loc. cit. t. 6. fig. 13, t. 12. fig. 19 *b*.)

Hab. E. Mexico: Cordova (*Sallé* [4]); Cerro de Palmas near Cordova (*Höge*); Orizaba (*Berendt* [1–3], *Botteri* [5]); Coatepec (*Quiroz* [5]).
Central Mexico: Cuautitlan * (*Strebel* [5]).
S. Mexico: Cumbre de Manzanilla, in the State of Chiapas (*Ghiesbreght* [1 5]).

b. *quadrifasciatus*: albidus, fasciis 4 fuscis continuis. (Fig. 15.)
(*Bulimulus chiapasensis*, var. γ, Fisch. & Crosse, loc. cit. fig. 6; *B. chiapasensis-delattrei*, Strebel, loc. cit. figg. 19 *a*, *c*.)

Hab. E. Mexico: Matlaquihahuitl, in the State of Vera Cruz (*Sallé* [4]); Cerro de Plumas near Cordova (*Höge* [5]).

c. *nebulosus*: nebulosus, sutura alba, fauce fusca.
(*Bulimulus chiapasensis*, form D (part.), Strebel, loc. cit. p. 72, t. 6. figg. 15, 16.)

Hab. E. Mexico: Coatepec (*Quiroz* [5]); Quimistlan, between Coatepec and the borders of the State of Puebla (*Doña Estefania* [5]).
Central Mexico: Cuautitlan (*Strebel* [5]).

Lives on trees in the interior of the woods (*Strebel*). The white form *a* seems to have been found in company with the four-banded one by Höge, and with the clouded one

* Quoted as "Cautlatitlan."

by Strebel. Strebel also mentions [5] specimens with spiral rows of small pellucid spots, which may form a transition between the forms *b* and *c*. He suggests that the aperture of Pfeiffer's original specimen may be somewhat deformed, and in this I am inclined to agree with him.

I prefer to write "*chiapensis*," because Chiapas seems to be the Spanish plural form, the city being called Chiapa in older works.

9. **Otostomus castus.** (Tab. XII. figg. 16–21.)

Bulimus castus, Pfr. P. Z. S. 1846, p. 112 [1]; Monogr. Helic. Vivent. ii. p. 47 [2]; Reeve, Conch. Icon. v., *Bulimus*, t. 45. fig. 282 [3]; ? Tate, in Am. Journ. Conch. v. pp. 152, 156 (1870) [4].

Bulimus (*Leiostracus*) *castus*, Pfr. in Malak. Blätt. ii. p. 153 (1855) [5].

Otostomus (*Leiostracus*) *castus*, H. & A. Adams, Gen. Moll. ii. p. 151 [6].

Bulimulus castus, v. Mart. in P. Z. S. 1875, p. 648 [7].

Bulimulus (*Drymæus*) *castus*, Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 485, t. 24. figg. 11, 11 *a–d* [8].

A. *typicus*: minor (long. 19–23, diam. 11, apert. 10–12½ millim.).
- *a*: uñicolor, albus, peristomate plus minusve roseo.
- *b*: irregulariter fusco-strigatus. (Fig. 17.)
- *c*: fasciis tribus fusco-nigris interruptis (Reeve, loc. cit. fig. 282) vel continuis. (Figg. 18, 19.)

Hab. CENTRAL AMERICA: probably Vera Paz (*Delattre* [1–4]: var. *a*).
N. GUATEMALA: Coban (*Morelet* [8], *Salvin* [7]: varr. *a*, *b*, *c*); Tamahu (*Sarg* [8]).

B. *xantholeucus*: major, paullo magis ventricosa (long. 25, diam. 14, apert. 15 millim.); alba, apice et peristomate subinde flavescentibus. (Figg. 16, 16 *a*.)

Hab. N. GUATEMALA: Sabo, in a tributary valley of the River Polochic, at an elevation of 3300 feet above the sea (*Champion*).

C. *porrectus*: elongatus, gracilior (long. 30–35, diam. 14–15, apert. 18–19 millim.).
- *a*: unicolor, albus, columella sola rubescente. (Fig. 20.)
  (*Bulimulus castus*, var. *β*, Fisch. & Crosse, loc. cit. fig. 11 *b*.)
- *b*: fasciis 2–3 violaceo-fuscis, apertura rosea.
  (*Bulimulus castus*, var. *γ*, Fisch. & Crosse, loc. cit. figg. 11 *c*, *d*.)
- *c*: parce strigatus, columella sola rosea. (Fig. 21.)

Hab. N. GUATEMALA: Coban or Tamahu (*Morelet* or *Sarg*: varr. *a*, *b*); Vera Paz (*Stoll*: varr. *b*, *c*).

The three varieties, A, B, C, appear to be distinct at first sight, but there are transitions between them in size, form, and colour. For example, one of Dr. Stoll's specimens from Vera Paz (fig. 21) is only 27 millim. long, but it exhibits the slender figure and more solid shell of var. C.

Fischer and Crosse [8] do not give separately the localities for the different varieties which they have described and figured. Tate [4] doubtfully records the occurrence of the species in Nicaragua—"in the mountain-forests of Javali and Peña Blanca, at an elevation of about 2500 feet above the sea," and at "Chontales"; he does not mention

either the size or the coloration of his specimens, so that we cannot refer them even by conjecture to any of the three forms which are indicated above.

10. **Otostomus angasi.**

Bulimus gabbi, Angas, P. Z. S. 1879, p. 477, t. 40. figg. 3 (four figures), 3 *a* (living animal) [1].

a: pallide rubescens, maculis rotundis albidis, fasciis obsoletis vel nullis. (Angas, loc. cit., the first and second figures: var. *a*.)

b: albidus, fasciis 3 fuscis alboguttatis. (Angas, loc. cit., the third figure: varr. *b* and *c*.)

c: unicolor, virescenti-flavescens vel albus. (Angas, loc. cit., the fourth figure and 3 *a*.)

Hab. N.E. Costa Rica: La Paz, on the road to the Rio Sarapiqui (*Biolley*).

Central Costa Rica: upon the flanks of Pico Blanco, at an altitude of from 3000 to 6000 feet, on the ground (*Gabb* [1]).

"Foot broad, pointed, and very flat. Animal varies with the colour of the shell from white to ash-colour, greenish-white or light brown." (Angas's fig. 3 *a*, whitish.)

This species appears to be intermediate between *O. castus* and *O. tripictus*, having the expanded peristome of the former, and somewhat resembling the latter in its painting. I have not seen a specimen of it.

The name *gabbi* is preoccupied by Fischer and Crosse (1872) for a Californian species.

11. **Otostomus dunkeri.** (Tab. XIII. figg. 1, 2, 2 *a*.)

Bulimus dunkeri, Pfr. in Philippi's Abbild. neuer Conch. ii. p. 112, t. 4. fig. 10 (1846) [1]; Monogr. Helic. Vivent. ii. p. 101 [2]; Reeve, Conch. Icon. v., *Bulimus*, t. 74. fig. 533 [3].

Bulimus (*Mesembrinus*) ***dunkeri***, Albers, Die Helic. ed. 1, p. 157 [4].

Bulimus (*Drymæus*) ***dunkeri***, Pfr. in Malak. Blätt. ii. p. 151 (1855) [5].

Orthalicus (*Mesembrinus*) ***dunkeri***, H. & A. Adams, Gen. Moll. ii. p. 157 [6].

Bulimulus (*Scutalus*) ***dunkeri***, v. Mart. in Malak. Blätt. xii. p. 36 (1865) [7]; Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 511 [8].

Bulimulus dunkeri, Strebel, Beitr. Mex. Land- und Süssw.-Conch. v. p. 76 [9].

Hab. Central Mexico: State of Michoacan (*Hegewisch* [1 2], *Uhde* [7 9]).

W. Mexico: Tepic (*Richardson*).

Var. *forreri*: maculis fulvo-fuscis subquadratis fasciatim dispositis vel irregularibus vario modo conjunctis pictus. (Figg. 2, 2 *a*.)

Bulimus fenestratus (Pfr.), Philippi, Abbild. neuer Conch. iii. p. 96, t. 9. figg. 1, 5 [10].

Bulimulus fenestratus, Strebel, Beitr. Mex. Land- und Süssw.-Conch. v. p. 75, t. 6. fig. 19 [11].

Bulimus (*Mesembrinus*) ***fenestralis***, Albers, Die Helic. ed. 1, p. 157 [12] (misprint).

Bulimulus forreri, Mousson, Journ. de Conch. xxxi. p. 217, t. 9. fig. 2 (1883) [13].

Hab. N. Mexico: Chihuahua (*Höge*).

N.W. Mexico: Ventanas, State of Durango (*Forrer* [13]).

Mexico: without nearer indication of locality (*Philippi* [10]).

The typical form (fig. 1) is easily recognizable by the pale round spots on a brownish ground. In the variety the brown colour is limited to more or less numerous patches,

which are either somewhat square and arranged in spiral rows (*Philippi*[10], and specimens from Chihuahua), or more irregular and combined, sometimes at acute angles (specimen from Ventanas); in a specimen from Chihuahua the pale spots of the type are seen within some of the larger brown patches.

The sculpture of this species is somewhat coarsely rugoso-striate, but it cannot be termed undulated, as in *O. fenestratus*, Pfr. Most of the specimens I have seen show remarkable irregularities and scars, some even at the apex, caused by previous fractures during life. Probably they live on conspicuous objects during the wet season, and often fall to the ground.

Radula of var. *forreri* examined by myself.

12. **Otostomus sulcosus.** (Tab. XIII. figg. 3, 3 *a*, 4.)

Bulimus sulcosus, Pfr. Symb. Hist. Helic. i. p. 43 (1841)[1]; Philippi, Abbild. neuer Conch. i. p. 56, t. 1. fig. 9[2]; Pfr. Monogr. Helic. Vivent. ii. p. 196[3].

Bulimus (*Mesembrinus*) *sulcosus*, Albers, Die Helic. ed. 1, p. 157[4]; Pfr. in Malak. Blätt. ii. p. 158 (1855)[5].

Orthalicus (*Mesembrinus*) *sulcosus*, H. & A. Adams, Gen. Moll. ii. p. 157[6].

Bulimulus (*Scutalus*) *sulcosus*, v. Mart. in Albers's Die Helic. ed. 2, p. 217[7]; Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 520, t. 23. figg. 2, 2 *a*, *b*[8].

Otostomus (*Scutalus*) *sulcosus*, v. Mart. Conch. Mittheil. ii. p. 193[9].

Bulimus hyematus, Reeve, Conch. Icon. v., *Bulimus*, t. 49. fig. 324 (1848)[10].

Bulimulus (*Scutalus*) *sulcosus*, var. a. *hiematus*, v. Mart. in Malak. Blätt. xii. p. 33 (1865)[11].

Var. *botterii*: fasciis continuis.

Bulimulus (*Drymæus*) *botterii*, Crosse & Fisch. in Journ. de Conch. xxiii. p. 52 (1875)[12]; Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 487, t. 24. figg. 10, 10 *a*[13]; Strebel, Beitr. Mex. Land- und Süssw.-Conch. v. p. 63[14].

Bulimus botterii, Pfr. Monogr. Helic. Vivent. viii. p. 61[15].

Bulimulus sulcosus, form A (part.), Strebel, loc. cit. p. 61, t. 6. fig. 17[16]; form B, p. 62, t. 5. fig. 4[17].

Hab. Central Mexico: near the city of Mexico (*Boucard*[8], *Hahn*[17]); valley of Mexico (*Bourgeau*[8]); Tacubaya (*Heyewisch*[1–3]); summit of the Sierra de las Aguas Escondidas, at an elevation of 9500 feet above the sea (*H. H. Smith*); Tuxpan * (*Strebel*[17]).

Mexico, without nearer indication of locality (*Uhde*[11]).

? E. Mexico: Orizaba (*Botteri*[12–16]).

* Strebel[17] mentions also a specimen of this species from "Tuspan, a little harbour on the east coast;" but as there are other localities of the same name on the plateau of Central Mexico, in the States of Michoacan and Jalisco, it is probable that one of these latter places may be intended. Respecting this, Strebel writes me as follows:—"I received the said specimen from an acquaintance who said he had found it at the harbour of Tuspan, but the same person lived usually on the elevated plateau of Mexico; whether it was a mistake I cannot decide." As all other localities for this species are confined to the central plateau of Mexico, and none of the numerous collectors who have explored the east coast have registered it from there, I think it safer not to include the east coast in the range of this species without further corroboration.

All authors describe the aperture of this species as having a simple (not reflected) edge, but I can see in some specimens a very faint, but distinct, expansion of the edge outwards: in one of the examples collected by Mr. H. H. Smith it is quite strong and 2 millim. broad. The interior of the aperture is described as chocolate-coloured: in the specimens collected by Uhde it is of a greyish rose-colour, in those by Mr. H. H. Smith either rose-coloured or pure white; the columella is in all of them white.

The largest specimens, long. 44 millim., unicolorous, white, are from the summit of the Sierra de las Aguas Escondidas, 9500 feet, near Omilteme, in the State of Guerrero, collected by Mr. H. H. Smith.

13. **Otostomus rudis.**

Bulimus rudis, Anton, Verz. d. Conch. Samml. p. 43 (1839)[1]; Pfr. Symb. Hist. Helic. ii. p. 50[2]; Monogr. Helic. Vivent. ii. p. 197[3]; Reeve, Conch. Icon. v., *Bulimus,* t. 44. fig. 286[4].

Bulimus (*Mesembrinus*) *rudis,* Albers, Die Helic. ed. 1, p. 157[5]; Pfr. in Malak. Blätt. ii. p. 158 (1855)[6].

Orthalicus (*Mesembrinus*) *rudis,* H. & A. Adams, Gen. Moll. ii. p. 157[7].

Bulimulus (*Scutalus*) *rudis,* Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 523, t. 23. figg. 6, 6 *a*, t. 22. figg. 7–11 (jaw, radula, anatomy)[8].

Bulimulus rudis, Strebel, Beitr. Mex. Land- und Süssw.-Conch. v. p. 63, t. 5. fig. 3, t. 6. fig. 9[9].

Otostomus (*Scutalus*) *rudis,* v. Mart. Conch. Mittheil. ii. p. 193[10].

Bulimulus sulcosus, form A, Strebel, Beitr. Mex. Land- und Süssw.-Conch. v. p. 61, t. 5. figg. 1, 2, t. 11. figg. 12 *a*, *b*, 13, 14, 15, t. 13. fig. 8 (radula)[11].

Bulimulus (*Scutalus*) *sulcosus,* var. *β. fenestratus,* v. Mart. in Malak. Blätt. xii. p. 34 (1865)[12].

Hab. Central Mexico: environs of the city of Mexico (*Hahn*[9 11]); Chapultepec (*Hegewisch*[2 3]); Angangueo, State of Michoacan (*Deppe*[11 12]).

Mexico, without nearer indication of locality (*Uhde*[11 12]).

O. rudis is very closely allied to *O. sulcosus*: the stripes are more numerous and distinct, the general form is more ventricose, the sculpture is, perhaps, a little less strong; and the interior of the aperture is pale yellowish, the outside stripes showing through. The specimen figured by Strebel[11] (t. 6. fig. 17) forms an intermediate link between them.

The habitat "Central America" given by Mörch, based on a young specimen, and brought forward with some doubt [Malak. Blätt. vi. p. 112 (1860)], is too indefinite to be admitted.

14. **Otostomus ghiesbreghti.** (Tab. XIII. figg. 5–10).

Bulimus ghiesbreghti, Pfr. in Malak. Blätt. xiii. p. 82 (1866)[1]; Novit. Conch. iii. p. 309, t. 75. figg. 6, 7[2]; Monogr. Helic. Vivent. vi. p. 46[3].

Bulimulus (*Scutalus*) *ghiesbreghti,* Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 522, t. 23. fig. 4[4].

Bulimulus ghiesbreghti, Strebel, Beitr. Mex. Land- und Süssw.-Conch. v. p. 60, t. 6. fig. 14[5].

Hab. S. Mexico: Chiapas (*Ghiesbreght*[1–3]); Tlacolula (*Höge*).

b. *stolli*: magis rugosus. (Figg. 5–8, 10.)

Bulimulus (*Scutalus*) *ghiesbreghti*, Fisch. & Crosse, loc. cit. p. 522, t. 23. fig. 4 *a* [6].
Bulimulus ghiesbreghti, Strebel, loc. cit. t. 5. fig. 5 [7].
Bulimulus jonasi, var. *stolli*, v. Mart. in Sitz.-Ber. Ges. naturf. Freunde Berl. 1886, p. 161 [8].

Hab. CENTRAL GUATEMALA: Llano of Quezaltenango, at an elevation of from 6000 to 9000 feet above the sea, common, chiefly on *Agave* and on various shrubs (*Stoll*); Argieta, department of Solola, in the "tierra fria" (*Bocourt* [6]); Los Encuentros, at an elevation of 8000 feet, at Tecpam 7000 feet, also on the northern slope of the Volcan de Agua, in the belt of tall forest-trees, at from 8000 to 9000 feet, and at Antigua (*Stoll*).

W. GUATEMALA: in the forest above the Hacienda de Las Nubes, on the southern slope of Cerro Zunil (*Champion*).

c. *interstitialis*: costis longitudinalibus rugularibus albis vel fulvescentibus, interstitiis læte fulvis in anfractu ultimo; pariete aperturali pallide rosea, columella alba. (Fig. 9.)

Hab. CENTRAL GUATEMALA: Cumbre de San Martin, on the N.W. slope of the Cordillera, at an elevation of 6000 feet (*Stoll*).

d. *iodostylus*: sculptura minus expressa.

? *Bulimulus iodostylus*, Pfr. P.Z.S. 1861, p. 23 [9]; Malak. Blätt. xi. p. 13 (1864) [10]; Monogr. Helic. Vivent. vi. p. 48 [11].
? *Bulimulus* (*Scutalus*) *iodostylus*, Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 539 [12].
Bulimulus iodostylus, Strebel, Beitr. Mex. Land- und Süssw.-Conch. v. p. 70, t. 12. figg. 8 *a*, 8 *b* [13].

Hab. S.W. MEXICO: Santa Efigenia, Tehuantepec (*Sumichrast* [13]).

Dr. O. Stoll states, in his MS. notes, that this species is very common at the above-mentioned elevations, but apparently does not occur on the most elevated ridges between Totonicapam and Tecpam, nor lower than 6000 feet on the terraces of the Cordillera at Santa Maria and San Martin. In dry weather it conceals itself on the lower face of blades of grass, but during and after rain it creeps about freely.

The relative proportion of the breadth to the length of the shell is very variable, as is also the size in this species. Its chief characteristics are the coarse plaits of the last whorl, the preceding whorls being remarkably smoother, and the rose-colour of the apertural wall and of the columella. The last-mentioned character distinguishes it—with few exceptions—from *O. sulcosus*, which is the corresponding form in the elevated plain of Central Mexico. The rose-colour, however, is somewhat variable: it is never wanting, and more or less intense on the upper half of the columellar margin, and extends sometimes upwards on to the parietal wall and beneath to near the base of the aperture; in some specimens the whole interior of the aperture is pale rose-coloured, and a stripe which on the outside is dark brown appears in the interior intense reddish-brown.

The living animal is described by Dr. O. Stoll as follows:—"Body broad, bulky,

4–4·3 centim. long; back coarsely longitudinally wrinkled, loamy yellow; sides with finer and more superficial and irregular wrinkles, pale brownish-grey. Upper feelers 9–10 millim. long, slender, yellowish-grey at the base, blackish-grey on their anterior part; eyes black. Lower feelers $2\frac{1}{2}$–4 millim. long, swollen at the base, pale grey. Face higher than broad, ochraceous-greyish. Hinder part of the foot with a distinct longitudinal median ridge, rounded at the extremity."

15. **Otostomus hegewischi.** (Tab. XIII. fig. 14, var.)

? *Bulimus* (*Bulimulus*) *nitidulus*, Beck, Index Moll. p. 67 (1838) (without description) [1].

Bulimus hegewischi, Pfr. Symb. Hist. Helic. ii. p. 46 (1842) (excl. var.) [2]; Monogr. Helic. Vivent. ii. p. 172 [3]; Reeve, Conch. Icon. v., *Bulimus*, t. 70. fig. 508 [4].

Bulimus (*Mesembrinus*) *hegewischi*, Albers, Die Helic. ed. 1, p. 157 [5]; Pfr. in Malak. Blätt. ii. p. 158 (1855) [6].

Orthalicus (*Mesembrinus*) *hegewischi*, H. & A. Adams, Gen. Moll. ii. p. 157 [7].

Bulimulus (*Mormus*) *hegewischi*, v. Mart. in Albers's Die Helic. ed. 2, p. 216 [8]; Malak. Blätt. xii. p. 28 (1865) [9].

Bulimulus (*Scutalus*) *hegewischi*, Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 526, t. 23. figg. 10, 10 *a* [10].

Bulimulus hegewischi, Strebel, Beitr. Mex. Land- und Süssw.-Conch. v. p. 66, t. 6. fig. 10 [11].

Hab. Central Mexico: environs of Mexico, in "tierra fria," on Cactus (*Sallé* and *Boucard* [10]); Toluca (*Höge*); Cuernavaca (*Godman*); Puebla and Tehuacan (*Uhde* [9 11]); Tenango (*Hegewisch* [2]).

b: minor, gracilior.

Bulimulus (*Scutalus*) *hegewischi*, var. γ, Fisch. & Crosse, loc. cit. p. 526, t. 23. fig. 10 *b* [12].

Hab. Mexico: exact locality not indicated.

c: flavescens, strigis castaneis frequentioribus.

Bulimulus (*Mormus*) *hegewischi*, var. *e*, v. Mart. in Malak. Blätt. xii. pp. 28, 29 (1865) [13].
Bulimulus hegewischi, no. 2, Strebel, loc. cit. p. 67 [14].

Hab. E. Mexico: Orizaba (*Uhde* [13 14]).

d: flavescens, strigis evanidis diaphanis. (Fig. 14.)

Hab. W. Mexico: Omilteme, in the State of Guerrero, at an elevation of 8000 feet (*H. H. Smith*).

This species is about intermediate between *O. recluzianus* and *O. ghiesbreghti*, Pfr.; it is rougher than the former and not so coarsely wrinkled as the latter; the stripes are ordinarily not abrupt below, and the columellar margin is white. Of the var. *c*, I know of only two young specimens; their stripes break up at the same height, but perhaps in the adult shell this may be otherwise. It is strange that the vars. *c* and *d*

should not have been found by other collectors, but I am unable to refer them to any other known Mexican species.

I have already stated [9] that the locality Pazquaro (Patzcuaro), State of Michoacan, is given in Pfeiffer's first description [2] only for the variety β, "fasciis latis tessellatis violaceo-fuscis," which is probably my *O. fenestrellus*; but in his other work [3] it stands alone for the whole species, owing possibly to the unintentional omission of the locality Tenango *. Neither Fischer and Crosse nor Strebel have noticed this.

Dr. Pfeiffer [3] quotes also "Seba, Thesaurus, iii. t. 39. fig. 49," as representing this species; but as the figure does not show the aperture the identification remains doubtful.

16. **Otostomus jonasi.** (Tab. XIII. figg. 11–13.)

Bulimus jonasi, Pfr. in Philippi's Abbild. neuer Conch. ii. p. 125, t. 5. fig. 4 (1846) [1]; Monogr. Helic. Vivent. ii. p. 107 [2]; in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, *Bulimus*, p. 168, t. 50. figg. 11, 12 [3]; Deshayes, in Férussac's Hist. Nat. Moll. Terr. ii. 2, p. 183, t. 150. figg. 17, 18 [4]; Reeve, Conch. Icon. v., *Bulimus*, t. 55. fig. 363 [5].

Bulimus (*Leiostracus*) *jonasi*, Albers, Die Helic. ed. 1, p. 156 (?) [6]; Pfr. in Malak. Blätt. ii. p. 153 (1855) [7].

Otostomus (*Leiostracus*) *jonasi*, H. & A. Adams, Gen. Moll. ii. p. 151 [8].

Bulimulus (*Mormus*) *jonasi*, v. Mart. in Albers's Die Helic. ed. 2, p. 216 [9]; Binney, Am. Journ. Conch. vii. p. 182 (1872) (jaw, radula) [10].

Bulimulus (*Scutalus*) *jonasi*, Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 525, t. 23. figg. 7, 7 *a* [11].

Bulimulus jonasi, v. Mart. in P. Z. S. 1875, p. 648 [12]; O. Stoll, Guatem. Reisen, p. 53 (1886) [13].

Otostomus (*Mormus*) *jonasi*, v. Mart. in Conch. Mittheil. ii. p. 193 [14].

Hab. Central Guatemala: Environs of the city of Guatemala (*Sallé* [11]; *Stoll* [13]); Antigua and Amatitlan (*Stoll*); Dueñas (*Champion*).

? N. Guatemala: Vera Paz (by error Vera Cruz) (*Delattre* [1–3 5 9 11]); Coban (*Salvin* [12]).

Costa Rica (*van Patten, in mus. Berol.*).

According to Dr. O. Stoll [13] (and in his MS. notes), this is the most common species of the genus on the Llano, or Plain, of the capital of Guatemala, though very irregularly distributed, in some spots very frequent, in others absent, perhaps owing to the pasture being burnt from time to time; it lives on the shrubs of *Baccharis salicifolia* (ord. Compositæ), and is also to be seen in the same localities in the dry season, suspended to the leaves and twigs, and closed by a diaphanous thin epiphragma, while other species are concealed in their hiding-places. This shell is generally found at

* There are about twenty localities of this name in the Republic of Mexico. To judge from the other localities for the species, it is probable that the one near Chalco, between the city of Mexico and Puebla, is intended.

an elevation of from 4000 to 5000 feet above the sea, occupying the next region below that of *O. ghiesbreghti*, but its area is somewhat less extended.

O. jonasi is very near *O. ghiesbreghti*, differing chiefly in the less rude and more regular sculpture, and generally also in its more slender form; the coloration is very similar, but the more numerous and straighter brownish furrows between the whitish plaits give it a somewhat different appearance. I have never seen a specimen so entirely yellow as that figured by Philippi.

Its presence in North Guatemala has not been corroborated by later travellers.

17. **Otostomus aurifluus.**

Bulimus aurifluus, Pfr. P. Z. S. 1856, p. 319, t. 35. fig. 10 [1]; Monogr. Helic. Vivent. iv. p. 400 [2]; Novitat. Conch. iii. p. 420, t. 95. figg. 13, 14 [3].

Bulimulus (*Mormus*) *aurifluus*, v. Mart. in Albers's Die Helic. ed. 2, p. 216 [4].

Bulimulus (*Drymæus*) *aurifluus*, Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 499, t. 20. figg. 21, 22 [5].

Bulimulus aurifluus, Strebel, Beitr. Mex. Land- und Süssw.-Conch. iv. t. 6. fig. 14, v. p. 79 [6].

Hab. E. Mexico: Jalapa (*Höge*); Mirador (*Berendt* [6]); Cordova (*Sallé* [1 2 5], *Höge* [6]); Plantation Toxpa (Tospan) near Cordova (*Berendt* [6]).

S. Mexico. Yalalag, near Villa Alta in the State of Oaxaca, on the eastern slope of the Cordillera, in dense forest (*Höge*); Juquila, State of Oaxaca (*Höge*).

At first sight this species much resembles *O. jonasi*; in *O. aurifluus*, however, the yellow stripes are on the same level as the whitish ground, whereas in *O. jonasi* the pale brown stripes are placed in depressions between the elevated whitish plaits. The edge of the aperture is also distinctly expanded in *O. aurifluus*, but only in full-grown specimens.

The locality "Vera Cruz," quoted by Dr. Pfeiffer [3], is probably intended for the State of that name, not the town.

18. **Otostomus recluzianus.**

Bulimus recluzianus, Pfr. in Zeitschr. für Malak. 1847, p. 82 [1]; Monogr. Helic. Vivent. ii. p. 172 [2], and iv. p. 468 [3], and in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, *Bulimus*, p. 119, t. 36. figg. 5, 6 [4]; Reeve, Conch. Icon. v., *Bulimus*, t. 74. fig. 530 [5].

Bulimus (*Oxycheilus*) *recluzianus*, Albers, Die Helic. ed. 1, p. 174 [6].

Bulimus (*Mesembrinus*) *recluzianus*, Pfr. in Malak. Blätt. ii. p. 159 (1855) [7].

Orthalicus (*Oxycheilus*) *recluzianus*, H. & A. Adams, Gen. Moll. ii. p. 155 [8].

Bulimulus (*Drymæus*) *recluzianus*, v. Mart. in Albers's Die Helic. ed. 2, p. 212 [9].

Bulimulus (*Scutalus*) *recluzianus*, Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 510 [10].

Bulimulus recluzianus, Strebel, Beitr. Mex. Land- und Süssw.-Conch. v. p. 68, t. 6. fig. 8 [11].

Hab. S. Mexico: Chiapas (*Ghiesbreght* [3]).

Var. *lineolatus*: minor, flavescens, longitudine aperturæ diametrum totius testæ non superante.

Bulimus lineolatus, Conrad, Proc. Acad. Phil. vii. p. 32 (1855)[12]; Pfr. Monogr. Helic. Vivent. iv. p. 398[13].

Hab. Central Costa Rica: San José (*Pittier and Biolley*); La Uruca, near San José, at an elevation of 1100 metres above the sea (*Biolley*); San Francisco de los Rios, also near San José, on hedges which surround the plantations of coffee (*Pittier*); Volcan de Cartago[12 13].

Costa Rica, without nearer indication of locality (*van Patten, in mus. Berol.*).

The stripes of this species are very irregular, even in the same specimen some are near one another and others have large intervals between them; often they are more greyish-violet than brown, from being situated in a more internal layer of the shell and covered by a thin whitish superficial coating. Ordinarily, the stripes break up at the same height at some distance from the umbilicus; in young specimens, as a general rule, they break up at the angularity in the middle of the whorl. The specimens from Costa Rica have generally a thinner and more yellow-coloured shell, and the largest which I have seen from that country is only 20 millim. long, perhaps not quite full-grown.

O. roseatus, Reeve, from Colombia, comes very near this species.

19. **Otostomus lirinus.**

Bulimus lirinus, Morelet, Test. Noviss. ii. p. 11 (1851)[1]; Pfr. Monogr. Helic. Vivent. iii. p. 313[2]; Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 494, t. 20. fig. 10[3].

Hab. N. Guatemala: San Luis de Peten (*Morelet* [1–3]).

20. **Otostomus cucullus.**

Bulimus cucullus, Morelet, Test. Noviss. i. p. 9 (1849)[1]; Pfr. Monogr. Helic. Vivent. iii. p. 383[2]; in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, *Bulimus*, p. 217, t. 60. figg. 11, 12[3].

Bulimus (*Leptomerus*) *cucullus*, Pfr. in Malak. Blätt. ii. p. 159 (1855)[4].

Bulimulus (*Mormus*) *cucullus*, v. Mart. in Albers's Die Helic. ed. 2, p. 216[5].

Bulimulus (*Scutalus*) *cucullus*, Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 519, t. 20. fig. 11[6].

b: *gracilior*.

Bulimulus (*Scutalus*) *cucullus*, var. *gracilior*, Fisch. & Crosse, loc. cit. p. 519, t. 20. fig. 12[7].

Hab. Yucatan: Sisal, on sandy ground (*Morelet* [1–3 6 7]).

Fischer and Crosse[6] rightly remark that this species, although at first sight resembling the genus *Succinea*, belongs really to *Bulimulus*. I think its nearest affinity is with *O. jonasi* and *O. hegewischi*, on account of the similar sculpture of the shell. The variety is much more slender; it seems to have been found in company with the typical form, and may be only an extreme individual variation.

21. **Otostomus fenestrellus.**

? *Bulimus hegewischi*, var. *β*, Pfr. Symb. Hist. Helic. ii. p. 46[1]; Monogr. Helic. Vivent. ii. p. 173[2].

Bulimulus (*Scutalus*) *fenestrellus*, v. Mart. in Monatsber. Akad. Wiss. Berl. 1863, p. 541 [3]; Malak. Blätt. xii. p. 35 (1865) (part.) [4]; Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 529 [5].
Bulimus fenestrellus, Pfr. Monogr. Helic. Vivent. vi. p. 144 [6].
Bulimulus fenestrellus, Strebel, Beitr. Mex. Land- und Süssw.-Conch. v. p. 64, t. 5. fig. 10 *b*, t. 13. fig. 5 (radula), t. 14. figg. 6 A, B (anatomy) [7].
Bulimus gealei, H. Adams, P. Z. S. 1867, p. 309, t. 19. fig. 21 [8]; Pfr. Monogr. Helic. Vivent. vi. p. 110 [9].
Bulimulus (*Scutalus*) *gealei*, Fisch. & Crosse, loc. cit. p. 536, t. 21. figg. 3, 3 *a*, *b* [10].

Var. *subunicolor*: albus, fasciis solum in fauce conspicuis.

Bulimulus (*Mormus*) *hegewischi*, varr. *c*, *d*, v. Mart. in Malak. Blätt. xii. pp. 28, 29 (1865) [11].
Bulimulus (*Scutalus*) *gealei*, var. *β*, Fisch. & Crosse, loc. cit. p. 536, t. 21. figg. 3 *c*, 3 *d* [12].
Bulimulus fenestrellus, var., Strebel, loc. cit. p. 65, t. 5. fig. 10 *a* [13].
Otostomus fenestrellus, v. Mart. Conch. Mittheil. ii. p. 193 [14].

Hab. CENTRAL MEXICO: elevated plain of Mexico (*Uhde* [3–6 10]); Matamoros Izucar, State of Puebla (*Boucard* [7–9]); Puebla (*Berkenbusch*); Patzcuaro, State of Michoacan (*Hegewisch* [1 2]).

The variety seems to be found in company with the banded specimens. In the disposition of the bands this species bears some resemblance to *O. serperastrum* and even to *O. emeus*; but the sculpture is distinctly more coarse, the vertical striæ are somewhat more wrinkled and prominent, the spiral striæ are not so fine and crowded, but rather irregular and broad, and, finally, the whole shell is more or less provided with small rounded impressions, which look as if they had been inflicted by blows from a hammer (malleated).

The specimen from Costa Rica, and the young one of yellow colour mentioned in my paper [4], I believe, after a fresh examination, do not belong to this species; the former = *O. costaricensis*, Pfr.

22. **Otostomus attenuatus.** (Tab. XIII. figg. 15, 15 *a*, *b*, 16, 16 *a*, *b*.)

Bulimus attenuatus, Pfr. P. Z. S. 1851, p. 256 [1]; in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, *Bulimus*, p. 83, t. 30. figg. 9, 10 [2]; Monogr. Helic. Vivent. iii. p. 336 [3] (nec Mousson, 1854).
Bulimus (*Leiostracus*) *attenuatus*, Pfr. in Malak. Blätt. ii. p. 152 (1855) [4].
Bulimulus (*Drymæus*) *attenuatus*, v. Mart. in Albers's Die Helic. ed. 2, p. 212 [5]; Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 491, t. 23. figg. 1, 1 *a* [6].
Bulimulus attenuatus, Strebel, Beitr. Mex. Land- und Süssw.-Conch. v. pp. 79–81, t. 5. figg. 7 *a*, *b* (not full-grown), 8 *a*, *b*, *c*, t. 13. fig. 13 (jaw) [7].
Otostomus (*Drymæus*) *attenuatus*, v. Mart. Conch. Mittheil. ii. p. 192 [8].
Bulimus kefersteini, Pfr. in Malak. Blätt. xiii. p. 82 (1866) [9]; Novit. Conch. iii. p. 310, t. 75. fig. 8 [10]; Monogr. Helic. Vivent. vi. p. 53 [11].

b. *concolor*: albus.

Bulimulus attenuatus, Strebel, loc. cit. t. 5. fig. 15 [12].

c. *varicosus*: paullo magis ventricosus; long. 36–37, diam. 16–18, apert. 17–19 millim. (Figg. 16, 16 *a*, *b*.)

Bulimus varicosus, Pfr. P. Z. S. 1851, p. 256[13]; in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, *Bulimus*, p. 83, t. 30. figg. 7, 8[14]; Monogr. Helic. Vivent. iii. p. 326[15].

Bulimus kefersteini, var. *β*, Pfr. Novit. Conch. iii. t. 76. fig. 9[16].

Hab. E. Mexico: Vera Cruz (*coll. Cuming*[1–3]); Orizaba (*Boucard*[6], *Botteri*[7 9 10]); Cordova, commonly, on orange-trees (*Höge*[7], *Berendt*[9 10]); Atoyac (*H. H. Smith*); Mirador (*Sartorius*).

Mexico, without nearer indication of locality[13–15].

d. *pittieri*: leviter striatulus et lineolibus spiralibus subtilissimis vix conspicuis, flavidus nitidulus, strigis fuscis inter se remotis, subundulatis, continuis.

Long. 30, diam. 13, apert. long. 15, diam. 8 millim. (Tab. XVI. fig. 1.)

Bulimus attenuatus, Angas, P. Z. S. 1879, p. 478[17].

Hab. S.W. Costa Rica: Alto de Mano Tigre, near Terraba, 690 metres above the sea (*Pittier*).

Central Costa Rica: Dota, a high hill-region, south of San José (*Gabb*[13]).

The white variety has been found in company with typically-coloured specimens at Atoyac (*H. H. Smith*) and Orizaba (*Botteri*).

The brown stripes are nearly perpendicular, often interrupted near the suture, and ordinarily less numerous in the last whorl than in the preceding ones; in some specimens they are entirely wanting in the last whorl, these forming a transition to the white variety. In a few specimens the stripes become broader and look rather like those of *O. serperastrum*, var. *paivanus*; but the shell is easily to be distinguished from that of *O. serperastrum* by its more attenuated shape and the much thinner, conspicuously spirally twisted columella. The apex of the shell and the inside of the aperture are in some specimens yellowish.

The var. *pittieri*, from Costa Rica, differs in the shell being smoother and rather yellowish, the streaks not interrupted; it has the aperture formed exactly as in typical *attenuatus*.

Nearly allied to this species is *O. fusoides*, d'Orb., from Quito; but the latter has a still more slender, turrite form, a proportionately shorter aperture, and the stripes more regularly equidistant and mostly forked upwards.

23. **Otostomus trimarianus,** sp. n. (Tab. XIII. fig. 17.)

Testa rimato-perforata, ovato-fusiformis, tenuiuscula, leviter striatula, nitidula, alba; subinde fragmentis fasciarum interruptarum picta; spira attenuata, acutiuscula, apice pallida; anfr. 7, convexiusculi, sutura impressa, subtiliter et irregulariter crenulata, ultimus basi modice attenuatus; apertura dimidia longitudine totius testæ brevior, subperpendicularis, ovali-oblonga, peristomate crassiusculo, breviter expanso, albo, margine columellari subrecto, crassiusculo, reflexo, perforationem semitegente.

Long. 32, diam. 14, aperturæ long. $14\frac{1}{2}$, apert. diam. 7 millim.
„ 27 „ 12 „ „ $12\frac{1}{2}$ „ „ 7 „

Hab. N.W. Mexico: Tres Marias Islands (*Forrer and Richardson*).

This species almost forms a connecting-link between *O. attenuatus*, *O. serperastrum*, and *O. pallidior*, Sow., the latter from the Peninsula of Lower California; it resembles *O. attenuatus*, but has not its thread-like, twisted, columellar margin. From *O. pallidior* it is distinguished by the less conical, in the last whorl much more oblong, form, the thinner shell, and the narrower aperture; from *O. serperastrum* also by the general shape of the shell. Some specimens are entirely white; others have more or less distinct traces of pale brown spots on the penultimate whorl arranged in four spiral rows, corresponding in position to those of *O. serperastrum* (the fifth and sixth being covered by the following whorl), but they do not extend over more than half the whorl in the spiral direction.

24. **Otostomus hepatostomus.** (Tab. XIII. figg. 18–20.)

Bulimus hepatostomus, Pfr. P. Z. S. 1861, p. 23, t. 3. fig. 4[1]; Malak. Blätt. viii. p. 13 (1861)[2]; Monogr. Helic. Vivent. vi. p. 43[3].

Bulimulus (*Drymæus*) ***hepatostomus,*** Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 493, t. 21. figg. 2, 2*a*[4].

Hab. S. Mexico: Tepanistlahuaca (*Boucard*[1–5]); Juquila, State of Oaxaca (*Höge*).

Nearly allied to *O. attenuatus*, but less attenuated, also somewhat variable in form. The brownish hue of the inside of the aperture is in some specimens very distinct, in others scarcely to be seen. On the outside of the second half of the last whorl the shell becomes in some examples rather wrinkled.

25. **Otostomus costaricensis.**

Bulimus costaricensis, Pfr. in Malak. Blätt. ix. p. 153 (1862)[1]; Monogr. Helic. Vivent. vi. p. 47[2]; Novit. Conch. iii. p. 419, t. 95. figg. 11, 12[3]; Angas, P. Z. S. 1879, p. 478[4].

Bulimulus (*Drymæus*) ***costaricensis,*** Pätel, Catalog. p. 100[5].

Bulimus navarrensis, Angas, P. Z. S. 1878, p. 73, t. 5. figg. 15, 16[6].

Hab. Central Costa Rica: San José (*Pittier and Biolley*); San Francisco de los Rios, near San José, on hedges (*Pittier*); Alajuela at an elevation of 900–1000 metres above the sea (*Orosco*); Cartago and Navarro (*Boucard*[6]); elevated plain of Costa Rica (*Hoffmann*).

Costa Rica, without nearer indication of locality (*von d. Busch*[1–3]).

Very near *O. attenuatus* and *O. hepatostomus*, but less attenuated, and with the stripes more interrupted, appearing in the upper whorls rather like interrupted spiral bands. Rather variable in size and proportional breadth: see the measurements given in the Table of species (*anteà*, p. 195). Most of the specimens I have seen are somewhat more elongated and less ventricose than Pfeiffer's original type[1–3]; but there are many gradations in this respect.

Dr. Pfeiffer received his specimen of this species from Dr. von der Busch in Bremen, with the statement that it came from Costa Rica. The Berlin Museum received examples of it many years ago from Mr. Carmiol, who travelled in Costa Rica, but he could not give the locality more definitely. Dr. Gabb has also reported it from the same country, without nearer indication.

26. **Otostomus pluvialis.**

Bulimus pluvialis, Pfr. in Malak. Blätt. ix. p. 153 (1862) [1]; Monogr. Helic. Vivent. vi. p. 115 [2]; Novit. Conch. iii. p. 423, t. 96. figg. 5, 6 [3].

Hab. Costa Rica (*von d. Busch* [1–3]).

Differs from *O. costaricensis* in the peristome not being expanded and in the more numerous linear brownish stripes. I have not seen a specimen of it.

27. **Otostomus bugabensis,** sp. n. (Tab. XIII. figg. 21, 21 *a*.)

Testa subimperforata, oblongo-fusiformis, tenuiuscula, leviter striatula, nitida, flava, strigis nigris latiusculis flexuosis, plerisque deorsum abbreviatis picta; spira conica, apice obtusiusculo, concolore vel albido; anfr. 6, convexiusculi, ultimus basi sensim attenuatus. Apertura dimidiam testæ longitudinem æquans, subperpendicularis, ovato-oblonga, intus æque ac extus colorata; peristoma leviter expansum, margine columellari subincrassato, distincte torto.

Long. 27, diam. 11; aperturæ long. 14, diam. $7\frac{1}{2}$? millim.

Hab. S. Panama: Bugaba, Department of Chiriqui, at an elevation of 1000 feet (*Champion*).

The two specimens obtained have the aperture damaged, but I cannot refer them to any known species.

28. **Otostomus sargi.** (Tab. XIV. figg. 2, 2 *a*, var.)

Bulimulus sargi, Crosse & Fisch. in Journ. de Conch. xxiii. p. 52 (1875) [1].

Bulimulus (*Scutalus*) *sargi*, Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 534, t. 24. figg. 6, 6 *a* [2].

Bulimus sargi, Pfr. Monogr. Helic. Vivent. viii. p. 59 [3].

Hab. N. Guatemala: Tamahu (*Sarg* [1–3]).

Var. *motaguæ*: minor, strigis magis discretis, rectilinearibus, in anfractibus superioribus nullis; long. 19–$21\frac{1}{2}$, diam. $8\frac{1}{2}$, apert. 11 millim. (Figg. 2, 2*a*.)

Hab. Central Guatemala: valley of the Rio Motagua (*Stoll*).

Distinct from its allies by the smaller size and the dark, almost completely black, stripes on white ground.

29. **Otostomus droueti.**

Bulimus droueti, Pfr. P. Z. S. 1856, p. 319,t. 35. f. 12 [1]; Monogr. Helic. Vivent. iv. p. 399 [2].

Bulimulus (*Scutalus*) *droueti*, Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 533, t. 23. figg. 9, 9 *a*, *b* [3].

Bulimulus droueti, Strebel, Beitr. Mex. Land- und Süssw.-Conch. iv. t. 6. fig. 13 [4]; v. p. 77, t. 6. fig. 6 (young), t. 12. figg. 7 *a*, *b*, *c* [5].

Bulimus sporlederi, Pfr. Malak. Blätt. xiii. p. 83 (1866) [6]; Monogr. Helic. Vivent. vi. p. 112 [7].

Bulimulus (*Scutalus*) *sporlederi*, Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 535, t. 21. figg. 5, 5 *a* [8].

Bulimulus sporlederi, Strebel, Beitr. Mex. Land- und Süssw.-Conch. iv. t. 6. fig. 12 [9]; v. p. 78, t. 12. fig. 9, t. 13. fig. 10 (radula), t. 14. figg. 18 A, B, C (anatomy) [10].

Otostomus (*Scutalus*) *sporlederi*, v. Mart. Conch. Mittheil. ii. p. 193 [11].

a: strigis fasciisque spiralibus combinatis.
(Pfr. P Z. S. 1856, t. 35. fig. 12; Fisch. & Crosse, loc. cit. t. 23. figg. 9, 9 *a*; Strebel, loc. cit. iv. t. 6. fig. 13, v. t. 12. fig. 7 *b*.)

b: strigis sat numerosis, undatis.
(Strebel, loc. cit. iv. t. 6. fig. 12; v. t. 12. figg. 7 *a*, 7 *c*.)

c: strigis rarioribus, rectilineis, obliquis.
(Fisch. & Crosse, loc. cit. t. 21. figg. 5, 5 *a*—*sporlederi*; Strebel, loc. cit. v. t. 12. fig. 9.)

d: maculis raris, solitariis.
(Fisch. & Crosse, loc. cit. t. 23. fig. 9 *b*—*droueti*, var. *γ*.)

Hab. E. Mexico: Pacho, Molino de Pedreguera, Coatepec, Chirimoyo, all near Jalapa, and Barranca de Mahuistlan, and San José Miahuatlan (*Strebel* [10]); Jalapa (*Höge*); Mirador (*Berendt* [5 6 7]); Orizaba (*Botteri* [1 2 5], *Sallé* [5]); Cordova (*Sallé* [1 3], *Höge* [5]); Plantation Toxpa (Tospan), near Cordova (*Berendt* [5]); Atoyac (*Höge*).

The vars. *a* and *b* have been procured together at Cordova by Herr Höge, the var. *b* only at Atoyac by the same collector. The var. *d* is only known from Orizaba. The var. *c* (*sporlederi*) is perhaps also distinguished by somewhat more flattened whorls, but in this respect there is also much variation in vars. *a* and *b*. Pfeiffer [7] has placed his *Bulimus sporlederi* far apart from *B. droueti* in another subdivision, because his specimen was not full-grown and had therefore the peristome quite straight, whereas in adult specimens it is a little expanded, though always very thin.

30. **Otostomus inglorius.** (Tab. XIV. figg. 1, 1 *a*, 4, 4 *a*, var.)

Bulimus inglorius, Reeve, Conch. Icon. v., *Bulimus*, t. 55. fig. 368 (1848) [1]; Pfr. Monogr. Helic. Vivent. iii. p. 419 [2].

Bulimus (*Mesembrinus*) *inglorius*, Pfr. Malak. Blätt. ii. p. 159 (1855) [3].

Hab. S. Mexico: Juquila, State of Oaxaca (*Höge*).

b. *heynemanni*: strigis fuscis latioribus et frequentioribus. (Figg. 1, 1 *a*, 4, 4 *a*.)

Bulimus heynemanni, Pfr. Malak. Blätt. xiii. p. 83 (1866) [4]; Monogr. Helic. Vivent. vi. p. 110 [5]; Novit. Conch. iii. p. 423, t. 96. figg. 3, 4 [6].

Bulimulus (*Scutalus*) *heynemanni*, Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 527 [7].

Bulimulus heynemanni, Strebel, Beitr. Mex. Land- und Süssw.-Conch. v. p. 68, t. 6. fig. 7 [8].

Bulimulus (*Scutalus*) *inglorius*, Fisch. & Crosse, loc. cit. p. 538, t. 21. figg. 9, 9 *a* (nec Reeve) [9].

Bulimulus inglorius, Strebel, loc. cit. p. 67, t. 5. figg. 9 *a*, *b* (nec Reeve) [10].

Hab. E. Mexico: Orizaba (*Botteri* [4–10]).

Central Mexico: Tecomavaca, in the State of Puebla, S.E. of Tehuacan, *Cactus*- and *Mimosa*-region (*Höge*).

S. Mexico: Cerro de San Antonio de la Cal, in the State of Oaxaca, on shrubs (*Boucard* [9]); Tlacolula, in the same State, copiously (*Höge*).

The typical form has only a few scattered brown stripes, ornamented by white dots; but the var. *heynemanni* is very richly painted with broad black stripes on a ground which is whitish on the upper whorls and becomes more and more ochraceous-yellow towards the lower half of the last whorl. The stripes often include small pure white round spots, or are jagged on the side towards the aperture, sometimes projecting two or three branches in that direction, which, if they are repeated in the following stripes, may form three broad interrupted spiral bands. All the stripes break off at the same distance from the umbilicus. Inside the aperture the black stripes are quite as conspicuous as on the outside.

In Dr. Pfeiffer's monograph [5], *Bulimus heynemanni*, Pfr., and *B. inglorius*, Reeve, are somewhat widely separated, the former in § 49, "subperforati vel obtecte perforati," and the latter in § 54, "perforati vel umbilicati." The umbilicus is always minute, but in some specimens cleft-like, oblong; in others from the same locality, similar in all other respects, it is nearly circular. Strebel [7] has already suggested the identity of *B. heynemanni* and *B. inglorius*, and after having examined a considerable number of specimens collected by Herr Höge, I quite agree with him.

31. **Otostomus maculatus.** (Tab. XIV. fig. 3.)

Bulimus maculatus, Lea, Observ. Unionidæ, ii. p. 86, t. 23. fig. 112 (1838) [1]; Pfr. Monogr. Helic. Vivent. ii. p. 205 [2]; Reeve, Conch. Icon. v., *Bulimus*, t. 48. fig. 309 [3]; Tate, Am. Journ. Conch. 1870, p. 156 [4]; Angas, P. Z. S. 1879, p. 479 [5] [not *B. maculatus*, Bruguière (1792), which = *Glandina dominicensis*, Gmel.].

Bulimus (*Leptomerus*) *maculatus*, Pfr. in Malak. Blätt. ii. p. 160 (1855) [6].

Orthalicus (*Leptomerus*) *maculatus*, H. & A. Adams, Gen. Moll. ii. p. 156 [7].

Bulimulus (*Liostracus*) *maculatus*, v. Mart. in Albers's Die Helic. ed. 2, p. 213 [8]; Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 505 [9].

Otostomus (*Leiostracus*) *maculatus*, H. Adams, P. Z. S. 1866, p. 443 [10].

Hab. N. Guatemala: Dolores and San Luis, district of Peten (*Morelet* [9]).

W. Guatemala: coast near Champerico, in woods, on the trunk of a young *Bombax ceiba* (*Stoll*).
Central Nicaragua: San Nicolas, copses in the Savana-region (*Tate* [4]).
Costa Rica (*Gabb* [5]).
S. Panama: Chiriqui (*mus. Brit.* [5]).
Colombia: Cartagena (*Gibbon* [1–3]).
Eastern Peru: Tributaries of the Upper Amazons (*Bartlett* [10]).

O. maculatus much resembles *O. dormanni*, Binn., from Florida, but is distinctly narrower in proportion to its length. The specimens collected by Dr. Stoll at Champerico measure:—length 22–23, breadth $9\frac{1}{2}$–10, and length of aperture $9\frac{1}{2}$–10 millim.; Morelet's specimen, according to Fischer and Crosse [9], is 26, $10\frac{1}{2}$, and $11\frac{1}{2}$ millim. The type from Cartagena, according to the figure given by Lea [1], has nearly the same dimensions as those from Champerico. The coloration appears to consist in all specimens of three upper rows of rather small squarish brown spots and two inferior bands of the same colour, the last close round the umbilicus. The uppermost row of spots is almost absent in one specimen from Champerico; in the third row of another specimen from the same locality the spaces between the spots are of a very pale brownish hue, so that the whole row may be described as a very pale band articulated by darker spots; in a third specimen, also from Champerico, the first of the two bands is here and there a little interrupted. Hence we may conclude that in this species, as in *O. dormanni*, there are typically five bands, the upper ones regularly broken up into rows of spots. In *O. dormanni* there is a distinct approximation or connection of two spots from different rows, but I can detect no trace of this in *O. maculatus*.

The specimens from Champerico exhibit a distinct, though very faint, thin, and short expansion of the outer edge of the aperture.

The living animal is described by Dr. O. Stoll as follows:—"Body rather small and narrow in proportion to the shell, 3 centim. long; back very convex, higher than broad, with irregular longitudinal wrinkles, whitish-grey, with a few very small blackish spots, as if it were dusty. Upper feelers 1 centim. long, thin, pale bluish in the hinder part, brownish-yellow anteriorly; eyes excentric, black. Lower feelers only 2 millim. long, slightly swollen at the base, bluish behind, brownish-yellow at the tip. Face narrow, produced; buccal lobes shorter than the lower feelers, extended downwards and forwards. Hind part of the foot flat, pointed, pale-coloured."

32. Otostomus totonacus.

Bulimulus totonacus, Strebel, Beitr. Mex. Land- und Süssw.-Conch. v. p. 84, t. 5. figg. 13, 13 *a* (shell), t. 13. figg. 11 A, H (radula), t. 14. figg. 9 A–F, and 10 E (anatomy) [1].
Otostomus (*Mormus*) *totonacus*, v. Mart. Conch. Mittheil. ii. p. 193 [2].

Hab. E. Mexico: Rancho de Quilate, near Misantla (*Doña Estefania* [1], *Höge*); Agua Caliente, also near Misantla (*Doña Estefania* [1]).

This fine species is distinguished by its thin pure white shell, with not very numerous round brown spots; these are arranged on the last whorl in four spiral rows, on the preceding whorl in three, in the one before that in two rows, those of the second rows being often a little larger than the others. The spots are placed rather distant one from the other, and they can also be regarded as being arranged in vertical rows, forming interrupted stripes from the suture towards the umbilicus, but this arrangement is not so regular as the spiral one. The spiral striæ of the shell are exceedingly fine. The aperture is pure white, the peristome very slightly reflected.

The average length of the shell is 28–30 millim.; but one figured by Strebel [1] (fig. 13 *a*) attains even 34½ millim., and one reported by Herr Höge, from Mexico, the locality of which is not especially stated, is only 24 millim. long. The breadth of the shell is equal to the length of the aperture and to about half the length of the whole shell.

This species closely approaches *O. maculatus*, Lea, from Guatemala, Colombia, &c., and *O. dormanni*, Binn., from Florida; the former is spotted in nearly the same way, but in shape it is distinctly more slender, being only 10½ millim. in breadth by 26 millim. in length.

The name "*totonacus*" is derived from the name of the tribe of the Totonacs, that dwell in the district of Misantla (*Strebel*, in litt.).

33. **Otostomus championi,** sp. n. (Tab. XIV. fig. 5.)

Testa perforata, ovato-conica, tenuis, confertim et subtiliter spiratim striata, nitida, diaphano-albida; spira conica, apice obtusiuscula; anfr. 6½, leviter convexi, regulariter crescentes, sutura alba, ultimus ventricosus, fascia subsuturali fusca, antrorsum obsolescente et maculis nonnullis fuscis sparsis picta; apertura rhombeo-ovata, paullulum obliqua, peristomate tenui, vix expansiusculo, margine columellari triangulatim dilatato, verticali, albido.

Long. 27, diam. 14½; apert. long. 13, diam. 9 millim.

Hab. W. Guatemala: Hacienda de Las Nubes, Cerro Zunil, Pacific slope, in the vicinity of the coffee-plantations, at an elevation of about 5000 feet (*Champion*).

I have seen only one specimen, but I cannot refer it to any known species.

34. **Otostomus emeus.** (Tab. XIV. figg. 6, 6 *a*–8, 8 *a*.)

Bulimus emeus, Say, New Harmony Disseminator, Jan. 1, 1829, p. 26 (ed. Binney, p. 40) [1]; Pfr. Monogr. Helic. Vivent. ii. p. 221 [2].

Bulimus mexicanus, var. *β. gracilior*, Pfr. Monogr. Helic. Vivent. ii. p. 102 [3].

Bulimus mexicanus (Lamarck), Reeve, Conch. Icon. v., *Bulimus*, t. 40. fig. 244 [4].

Bulimulus (*Liostracus*) *mexicanus*, var. *β. gracilior*, v. Mart. in Malak. Blätt. xii. p. 23 (1865) [5].

Bulimus ziegleri, var. *β*, Pfr. Monogr. Helic. Vivent. ii. p. 175 [6].

Bulimus ziegleri, Reeve, Conch. Icon. v., *Bulimus*, t. 58. fig. 389 [7].

Bulimulus (*Thaumastus*) *tryoni*, Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 565 (part.) [8].
Bulimulus (*Liostracus*) *alternans*, var. δ, Fisch. & Crosse, loc. cit. p. 501 [9].
Bulimus baezensis (Hidalgo), Pfr. Monogr. Helic. Vivent. viii. p. 47 (part.) [10].
Bulimulus palpaloensis, Strebel, Beitr. Mex. Land- und Süssw.-Conch. v. pp. 85–87, t. 5. figg. 12 *a–c*, t. 13. fig. 14 (radula), t. 15. figg. 1 A–L (anatomy), t. 16. figg. 4, 7, 8, 11 (jaw) [11].
Otostomus (*Drymæus*) *palpaloensis*, v. Mart. Conch. Mittheil. ii. p. 190 [12].

Hab. E. Mexico: Papantla and Misantla, in woods (*Deppe and Schiede* [5]); Quilate, Arroyo del Obispo, Camino de Arroyo Hondo, and Rancho de Guerrero, all near Misantla (*Berendt and Strebel* [11]); Nautla, Molino de Pedreguera, Coatepec, Dos Arroyos, Pacho, and Cuauatitlan, all near Jalapa (*Berendt and Strebel* [11]); Jalapa, Playa Vicente, Cordova, and Atoyac (*Höge*); on the road from Vera Cruz to Mexico [1].

S.E. Mexico: Teapa in Tabasco (*H. H. Smith*).

b. *hypozonus*: minor, paullo magis ventricosus, peristomate recto, plerumque flavidus, fasciis tantum 1–2 basalibus continuis.

Bulimulus palpaloensis, var., Strebel, loc. cit. p. 85, t. 5. figg. 12 *d*, 16 [13].

Hab. E. Mexico: Jalapa and Cordova (*Höge*, *M. Trujillo*); East Mexico, at one or the other of the above-named localities (*Strebel* [13].)

c. *albivaricosus*: valde minor, subunicolor, strigis raris albis, fasciis tantum in anfractibus superioribus conspicuis. (Figg. 8, 8 *a*.)

Hab. E. Mexico: Playa Vicente, dense forest, oaks prevailing (*Höge*).

d. *membranaceus*: unicolor, diaphano-albidus.

? *Bulimus membranaceus*, Philippi, Abbild. neuer Conch. ii. 13. p. 126, t. 5. fig. 2 [14]; Pfr. Monogr. Helic. Vivent. ii. p. 102 [15]; vi. p. 57 [16].
Otostomus (*Mormus*) *membranaceus*, v. Mart. Binnenmoll. Venez. p. 30 (specimen from Mirador) [17].
Bulimulus palpaloensis, var., Strebel, Beitr. Mex. Land- und Süssw.-Conch. v. p. 85, t. 5. fig. 12 *e* [18].

Hab. E. Mexico: Mirador (*Sartorius* [17]); at one or more of the above-named localities, probably Misantla (*Strebel* [18]).

? W. Mexico: "Pacific provinces of Mexico" [16].

The variations in colour are fully described by Strebel [11]; the ground-colour is either white or pale yellow, and there are ordinarily five reddish-brown bands, which are either continuous or interrupted into rows of spots, or also very pale with darker spots. The lower bands are mostly continuous. The uppermost or the two upper bands are absent in several specimens; if also the third is wanting, we have the variety *b*, *hypozonus*, which, however, is ordinarily of a more ventricose form. Many young specimens show only the two lower bands. The two and a half upper whorls are finely cancellated.

Strebel states [11] that this species is often found on a shrub called "huichin," which bears umbels of 40–50 yellow flowers (capitula ?), and belongs to the natural order

Compositæ; the botanical name of this plant he could not ascertain. Palpalo is the name of a river in the district of Misantla.

This species has been greatly misunderstood and confounded with others, no doubt on account of its great variation in colour and its peristome being so slightly expanded; in an artificial system it might quite as well be placed among the species with simple and straight as among those with expanded peristome. From the original description, together with the locality indicated, I have no doubt that Say's *Bulimus emeus* [1] is identical with Strebel's *Bulimulus palpaloensis* [11]. For *Bulimus mexicanus* of Lamarck, see below (p. 251) among the pseudo-Mexican species.

As regards Philippi's *B. membranaceus*, I have not seen a typical specimen; but his description and figure [14], compared with the example from Mirador [17], lead me to presume that it may belong to the unicolorous variety of *O. emeus* (=*palpaloensis*). The shell figured by Reeve as *B. membranaceus* (Conch. Icon. v., *Bulimus*, t. 75. fig. 544) is not Philippi's type; it is probably similar to the Venezuelan specimens referred by me to *O. membranaceus* in the paper quoted above [17], and which may now be separated as a distinct species under the name of *Otostomus venezuelensis*.

35. **Otostomus irazuensis.** (Tab. XIV. figg. 12, 12 *a*, 13, 13 *a*, varr.)

Bulimus irazuensis, Angas, P. Z. S. 1878, p. 73, t. 5. figg. 17–20 [1].
Bulimulus irazuensis, Binney, Ann. N. York Acad. i. p. 262, t. 11. fig. L (radula, jaw) (1879) [2].
Otostomus (?) *irazuensis*, v. Mart. Conch. Mittheil. ii. p. 193 [3].

a: strigis fuscis, plus minusve numerosis, subfulguratis.
(Angas, loc. cit. figg. 18, 20.)

b: pallide fuscescens, albido-aspersus (et guttulis nonnullis fuscis). (Figg. 13, 13 *a*.)
(Angas, loc. cit. fig. 17.)

c: fasciis 3 fuscis, latiusculis, albo-guttulatis. (Figg. 12, 12 *a*.)

Hab. Central Costa Rica: Volcan de Irazu, on low aromatic bushes on the eastern slope (*Boucard* [1]); Tierra Blanca, on the southern slope of the Volcan de Irazu, at an elevation of 1800 metres above the sea (*Biolley*).
Costa Rica, without nearer indication of locality (*van Patten*).

The varieties *a* and *b* have been procured in company, together with specimens approaching to *c* (Angas [1], fig. 18), both by Boucard and Biolley, on the slopes of the Volcan de Irazu. Of var. *c* I know of only one specimen, here figured, found among those collected by Van Patten: in one of his examples the peristome is slightly expanded.

This species agrees with *O. tripictus* in having a rose-coloured, simple peristome, but differs from it in the more elongate form and the rougher sculpture of the shell, also in the style of painting.

36. **Otostomus tripictus.** (Tab. XIV. figg. 11, 11 *a*, var.)

Bulimus tripictus, Albers, in Malak. Blätt. iii. p. 97 (1857)[1]; Pfr. Monogr. Helic. Vivent. iv. p. 468[2]; v. Mart. in Jahrbuch d. deutschen Malak. Ges. iii. p. 256[3]; Angas, P. Z. S. 1879, p. 478[4].

Bulimulus rhodotrema, v. Mart. in Malak. Blätt. xv. p. 156 (1868)[5].

Bulimus rhodotrema, Pfr. Novit. Conch. iii. p. 463, t. 101. figg. 10, 11[6]; Monogr. Helic. Vivent. viii. p. 146[7].

Hab. Costa Rica (*coll. Mousson*[1 2], *Carmiol*[5–7], *Gabb*[4]).

b. *hoffmanni*: gracilior, fascia supera et infera simplice, media sola maculosa. Long. 19, diam. $9\frac{1}{2}$, apert. $10\frac{1}{2}$ millim. (Figg. 11, 11 *a*.)

Hab. Central Costa Rica: Woods of San Lorenzo de Dota, 1300 metres above the sea (*Pittier*).

S.W. Costa Rica: Heredia, on trees (*Carl Hoffmann*, 1856).

Easily to be recognized by the ventricose shape, the broad bands composed of arrow-like or zigzag spots, and the bright rose-colour of both the apex and the peristome. In many specimens there is another, also rose-coloured, stripe somewhat behind the aperture; it is the remnant of a previously formed peristome. In worn specimens the apex becomes greyish, but the aperture retains the rose-colour.

Some years ago[5] I was led into an error concerning this species, owing to the original label "*tripictus*" being attached to a very different species, *O. meridanus*, Pfr., from Colombia, in the collection left by Albers (*cf.* v. Martens, in Albers's 'Die Heliceen,' ed. 2, p. 213); therefore I described "*rhodotrema*" as new. But afterwards I satisfied myself that Albers's original description[1] could not be applied at all to the shell in his collection, but very well to the specimens of *rhodotrema*[3].

The var. *hoffmanni* somewhat approaches *O. irazuensis* in form, but it has a smooth shining surface to the shell, and the characteristic painting, at least in the middle band, conforms to the type; the tip of the shell, however, is whitish.

37. **Otostomus sulfureus.** (Tab. XIV. figg. 14–18.)

Bulimus sulphureus, Pfr. P. Z. S. 1856, p. 318, t. 35. fig. 11[1]; Monogr. Helic. Vivent. iv. p. 412[2].

Bulimulus (*Drymæus*) *sulfureus*, v. Mart. in Albers's Die Helic. ed. 2, p. 212[3].

Bulimulus (*Drymæus*) *sulphureus*, Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 495, t. 23. figg. 3, 3 *a*[4].

Bulimulus sulphureus, Strebel, Beitr. Mex. Land- und Süssw.-Conch. v. p. 87, t. 5. figg. 11 *a–d*, t. 13. figg. 15, 15 *b*, 16 (radula), t. 15. figg. 2 A–C (anatomy)[5].

Otostomus (*Drymæus*) *sulfureus*, v. Mart. Conch. Mittheil. ii. p. 192[6].

Bulimus moricandi (Pfr.), Tristr. P. Z. S. 1861, p. 230[7].

Hab. Central Mexico: near the city of Mexico (*Hahn*[5]).

E. Mexico: Consolapa and Soncoautla, both near Jalapa (*Strebel*[5]); Mirador (*Strebel*[5]); Atoyac and Orizaba (*Höge*); Cordova (*Sallé*[1 2 4]).

S.E. Mexico: Teapa in Tabasco (*H. H. Smith*).

N. Guatemala: Cubilguitz, north of Coban, in the dense forests of Vera Paz,

drainage into the Rio de la Pasion (*Champion*); Chiacam, near Lanquin, on the Cahabon River (*Champion*); Coban (*Sarg* [7]); San Joaquin, below San Cristobal, in the valley of Rio Chisoy (*Champion*); Chacoj and Senahu, Polochic Valley (*Champion*); Panzos in the same valley (*Conradt and Godman*).

NICARAGUA: La Libertad (*Belt*).

b. *albidus*.

Bulimulus (*Drymæus*) *liliaceus*, Fisch. & Crosse, loc. cit. p. 496 (part.), t. 23. fig. 8 [8].

Hab. E. MEXICO: Jalapa (*Höge*).

S.E. MEXICO: Teapa in Tabasco (*H. H. Smith*).

MEXICO, without nearer indication (*Cuming, in coll. Albers*).

N. GUATEMALA: San Luis de Peten (*Morelet* [8]); Coban (*Bocourt* [8], *Salvin*).

c. *gracilior*: long. 28–29, diam. 10–12, apert. 11–13 millim. (Fig. 14.)

Bulimulus (*Drymæus*) *liliaceus*, var. *β*, Fisch. & Crosse, loc. cit. p. 496, t. 23. fig. 8 *a* [9].

Bulimulus sulphureus, form B, Strebel, loc. cit. p. 88, t. 6. fig. 5 [10].

Hab. N. GUATEMALA: Senahu (*Champion*).

W. GUATEMALA: Retalhuleu (*Stoll*).

S.W. GUATEMALA: San Agustin (*Bocourt* [9]); Zapote, on the slope of the Volcan de Fuego (*Champion*).

NICARAGUA: La Libertad (*Belt*).

d. *citronellus*: subconicus, læte flavus, sutura alba. Long. 27, diam. 13, apert. 12 millim. (Figg. 16, 17.)

Bulimus citronellus, Angas, P. Z. S. 1879, p. 479, t. 40. fig. 5 [11].

Hab. N.E. COSTA RICA: Puerto Viejo on the Rio Sarapiqui (*Biolley*).

CENTRAL COSTA RICA: San José, and La Uruca near San José (*Biolley*); Alajuela at an elevation of 900 to 1000 metres above the sea (*Orosco*); Suralres, alt. 600 metres, near San Mateo (*Biolley*).

S.W. COSTA RICA: Boruca, alt. 450 metres (*Pittier*); Alto de Mano Tigre, 690 metres (*Pittier*).

S.E. COSTA RICA: between Urea and Liporia, on the low hills (*Gabb* [11]).

COSTA RICA, without nearer indication of locality (*Carmiol*).

e. *obesus*: subconicus, brevior, albidus, unicolor. Long. 26, diam. 14, apert. 13 millim. (Fig. 18.)

Hab. E. MEXICO: Huatusco, in the State of Vera Cruz (*Hille, in Dunker's collection*).

Animal greenish (*Berendt* [5]). Animal of var. *citronellus* white; tentacles very long: arboreal (*Gabb* [11]). H. Pittier found the same variety under the bark of a dead tree.

This species has been confounded sometimes with the white *O.* (*Helix*) *liliaceus* of Férussac, Prodrome général, no. 401 (1821–22) (Pfr. Monogr. Helic. Vivent. ii. p. 203; Deshayes, in Férussac's Hist. Nat. Moll. Terr. ii. 2, p. 83), from Porto Rico: according to the specimens collected by Herr Gundlach at Quebradillas and elsewhere in this island, *O. liliaceus* differs from *O. sulfureus* not only in its pure white, somewhat creta-

ceous colour, but also in the more conical form of its shell, the last whorl being less attenuated beneath, more bag-like (saccatus). As the difference is more easily explained by a drawing than by description, two figures of this Porto-Rican shell are given (Tab. XIV. figg. 19, 20). Although neither the figure in Deshayes's continuation of Férussac's Hist. Nat. Moll. Terr. t. 142 B. fig. 11, nor that given by Fischer and Crosse [8] (t. 23. fig. 8), exhibits this difference very clearly, I prefer to restrict the name "*liliaceus*" to the Porto-Rican shell.

Férussac's fig. 14 and Fischer and Crosse's fig. 8 *a* well represent *O. flavidus*, Menke, from Venezuela: see my essay on the Land and Freshwater Mollusca of Venezuela ('Die Binnenmollusken Venezuela's'), p. 29 (1873).

O. virginalis, Pfr., from Venezuela, common near Caracas, also belongs to the same group; it is white, and nearly as slender as var. *b* of *sulfureus*, with proportionately smaller aperture, only two-fifths of the length of the shell. Pfeiffer, 'Novitates Conchologicæ,' iii. p. 422, mentions a variety of it from Chiapas, distinguished by the more rounded last whorl and a rounded aperture; I suspect this is a whitish specimen of *O. sulfureus*, var. *b*.

The specimens of *O. virginalis* examined by Strebel, Beitr. Mex. Land- und Süssw.-Conch. v. pp. 88, 89, were from Caracas.

Our var. c, *gracilior*, is very near *O. flavidus*, Menke [see v. Mart. Binnenmoll. Venezuela's, p. 29; Férussac, t. 142 B. fig. 14; Reeve, Conch. Icon. v., *Bulimus*, t. 45. fig. 287 (*liliaceus*)]; but I have not yet seen a specimen from Mexico or Central America with the delicate rosy hue on the lower half of the last whorl which is so characteristic of this species.

38. **Otostomus moricandi.**

Bulimus moricandi, Pfr. P. Z. S. 1846, p. 113 [1]; Monogr. Helic. Vivent. ii. p. 109 [2]; Reeve, Conch. Icon. v., *Bulimus*, t. 45. fig. 283 [3].

Bulimus (*Leiostracus*) *moricandi*, Pfr. in Malak. Blätt. ii. p. 153 (1855) [4].

Bulimulus (*Liostracus*) *moricandi*, v. Mart. in Albers's Die Helic. ed. 2, p. 213 [5].

Bulimulus (*Drymæus*) *moricandi*, Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 497, t. 24. figg. 9, 9 *a* [6].

Hab. N. Guatemala: Coban (*Delattre* [2]); Vera Paz (*Morelet* [6]).

Var. *hyalino-albidus*.

Bulimus moricandi, var., Pfr. Monogr. Helic. Vivent. iv. p. 398 [7].

Bulimulus (*Drymæus*) *moricandi*, var. *β. hyalino-albida*, Fisch. & Crosse, loc. cit. p. 498 [8].

Hab. S. Mexico: Chiapas (*Ghiesbreght* [7 8]).

Yucatan (*F. D. Godman*, Feb. 1888).

E. Guatemala: Yzabal (*Stoll*).

I have never seen a reliable specimen of *O. moricandi*. Judging from the description and the figures, it resembles in sculpture and coloration *O. sulfureus*, but differs in the

proportionately large aperture, which even exceeds half the length of the whole shell, and the convex, somewhat blunt spire, this last-mentioned character bringing it nearer *O. delattrei*.

The locality "Mexico" (*Biart* [6]) for the typical form I have omitted, as it is too vague; and that of "Vera Cruz," quoted by me [Malak. Blätt. xii. p. 70 (1868)], was caused by an erroneous identification with an unusally large specimen of *O. sulfureus*. The specimen determined by the Rev. H. B. Tristram as *Bulimus moricandi* proves by its slender spire to be a young *O. sulfureus* (cf. *anteà*, p. 225).

Strebel's *Bulimula chiapasensis*, form C, Beitr. Mex. Land- und Süssw.-Conch. v. p. 71, t. 6. fig. 18, closely resembles *O. moricandi* in the size and form of the aperture; but it has the spire distinctly more conical. This shell was obtained in the northern part of Eastern Mexico at Paso de la Balza, near Tuzamapan, between Huatusco and Jalapa: I dare not identify it with either *O. moricandi* or *O. chiapensis*.

39. **Otostomus moritinctus,** sp. n. (Tab. XIV. figg. 9, 9 *a*, *b*, 10, 10 *a*.)

Testa rimata, ovato-oblonga, sat tenuis, irregulariter striatula, nitida, isabellino-albida, fascia unica peripherica fusco-nigra latiuscula, strigis solitariis perpaucis fuscis et punctis nigris sparsis picta; spira conica, apice obtusiusculo nigricante vel fuscescente; anfr. 6, convexiusculi, ultimus basi leviter attenuatus, subinde roseo-tinctus; apertura dimidiam testæ longitudinem æquans, paullum obliqua, acuminato-oblonga, intus æque ac extus colorata; peristoma simplex, rectum, margine columellari tenui, leviter arcuato, ad rimam umbilicalem breviter reflexo et appresso.

Long. 26–29, diam. 13, apert. 14–15 millim.

Hab. W. Mexico: Chilpancingo, in the State of Guerrero, at an elevation of 4600 feet above the sea (*H. H. Smith*).

Varies somewhat in the more or less pure whitish, yellowish, or slightly reddish hue of the general coloration, in the more or less broad and dark peripherical band, in the presence, disposition, and number of the black points, which are either arrow-like or rounded, and in the presence or absence of a large brown streak near the aperture; the base of the shell near the umbilical cleft is in some examples bright rose-coloured. The uppermost whorl is curiously punctured (fig. 9 *c*).

This species seems allied to *O. livescens*, Pfr., but may be distinguished, apart from the coloration, by its larger size, more ventricose whorls, proportionately larger aperture, and more glossy appearance. In its coloration it bears a remarkable resemblance to *O. virgultorum*, Morelet, from Eastern Peru; but the latter is a more cylindrical shell, its last whorl being proportionately much smaller, and it has also a dark band round the umbilicus.

40. **Otostomus livescens.** (Tab. XV. figg. 7, 8.)

Bulimus livescens, Pfr. Symb. Hist. Helic. ii. p. 48 (1842) [1]; Monogr. Helic. Vivent. ii. p. 175 [2]; Reeve, Conch. Icon. v., *Bulimus*, t. 47. fig. 304 [3]; Philippi, Abbild. neuer Conch. iii. p. 96, t. 9. fig. 3 [4].

Bulimus (*Mesembrinus*) *livescens*, Albers, Die Helic. ed. 1, p. 157 [5]; Pfr. in Malak. Blätt. ii. p. 158 (1855) [6].

Orthalicus (*Mesembrinus*) *livescens*, H. & A. Adams, Gen. Moll. ii. p. 157 [7].

Bulimulus (*Mesembrinus*) *livescens*, v. Mart. in Albers's Die Helic. ed. 2, p. 214 [8]; Malak. Blätt. xii. p. 27 (1865) [9]; Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 543 [10].

Bulimulus livescens, Strebel, Beitr. Mex. Land- und Süssw.-Conch. v. p. 91, t. 6. fig. 4 [11].

a: fasciis et strigis fuscis distinctis.

b: fasciis et strigis interstitialibus pallidioribus.
(var. β, Pfr. Symb. Hist. Helic. ii. p. 48, and Monogr. Helic. Vivent. ii. p. 175; Strebel, loc. cit. t. 6. fig. 4; v. Mart. in Malak. Blätt. xii. p. 27.)

c: fasciis tribus, strigis nullis.
(Reeve, loc. cit. t. 47. fig. 304.)

d: fascia supera 1 angusta, infera 1 paullo latiore et serie macularum intermedia. (Fig. 8.)

e: fasciis 2 inferis.
(Philippi, loc. cit. t. 9. fig. 3.)

f: subunicolor, albidus, strigis nonnullis.
(typ., Pfr. Symb. Hist. Helic. ii. p. 48, and Monogr. Helic. Vivent. ii. p. 175; v. Mart. in Malak. Blätt. xii. p. 27.)

Hab. Central Mexico: Tehuacan (*Hegewisch* [1–4 11], *Uhde* [10 11]); Tecomavaca, in the State of Puebla, S.E. of Tehuacan, *Cactus*- and *Mimosa*-region (*Höge*).
W. Mexico: Chilpancingo, in the State of Guerrero (*H. H. Smith*).

In var. *b* the two upper bands are visible also on the preceding whorls, the two lower ones only on the last whorl—these are broader than the others, and the fourth band is near the umbilicus, but does not touch it; most of the vertical stripes are between the first and second bands; others are immediately below the suture, but these are ordinarily paler and short. In var. *d* the second band is represented by a row of small pale brown spots, and the fourth band is often very faint, the two others being very dark.

The vars. *a* and *f* have been found in company at Tehuacan by Herr Uhde, and at Tecomavaca by Herr Höge. The vars. *c* and *e* were collected also in company by Herr Höge, but he has not indicated their exact locality.

Dr. Pfeiffer has regarded the banded specimens as variety β; but as their painting is very characteristic I prefer to place them, as form *a*, first. The apex in some specimens is blackish-brown, in others only pale brown or even yellowish.

Dr. Mörch, in Malak. Blätt. vi. p. 112, enumerates this species with some doubt among those collected by Œrsted in Nicaragua or Costa Rica, having only two young specimens for examination. As this occurrence has not been corroborated by later collectors, I think it unsafe to admit it among the ascertained localities.

Jaw and radula examined by myself.

41. Otostomus discrepans.

Bulinus discrepans, Sowerby, P. Z. S. 1833, p. 72[1]; Conch. Illustr., *Bulinus*, fig. 52[2]; Tate, Am. Journ. Conch. v. pp. 152, 156 (1870)[3].

Bulimus (*Bulimulus*) *discrepans*, Beck, Index Moll. p. 65[4].

Bulimus discrepans, Deshayes, in Lamarck's Hist. Nat. des Anim. sans Vert. ed. 2, viii. p. 279[5]; Pfr. Monogr. Helic. Vivent. ii. p. 176[6]; Reeve, Conch. Icon. v., *Bulimus*, t. 23. fig. 146[7].

Bulimus (*Mesembrinus*) *discrepans*, Albers, Die Helic. ed. 1, p. 158[8]; Pfr. in Malak. Blätt. ii. p. 158 (1855)[9].

Orthalicus (*Mesembrinus*) *discrepans*, H. & A. Adams, Gen. Moll. ii. p. 157[10].

Bulimulus (*Liostracus*) *discrepans*, Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 503[11].

Hab. Central Guatemala: Salama (*Morelet*[11]); San Gerónimo near Salama (*Champion*).
E. Guatemala: Zacapa, on *Cereus* sp. (*Stoll*).
Salvador: Conchagua, under the bark of trees (*Cuming*[1 2 6 7]).
Central Nicaragua: Granada, Masapa, San Nicolas, in the Savana-region (*Tate*[3]).
N.W. Costa Rica: Guanacasta, in the Bay of Salinas, in the woods (*Pittier*).

The name *discrepans* refers to the difference in the painting of the upper and lower parts of the shell: on the upper part of the last and on the visible part of all the preceding whorls are very narrow, but sharply delineated, oblique, dark brown stripes, two of which are often nearer to each other; at the base of the last whorl, on the contrary, are two spiral dark brown bands, and the space between them is sometimes yellow, but often whitish like the rest of the shell. A similar discrepancy of the painting is to be seen in the widely remote genus *Amphidromus* of the Malayan Archipelago, where most of the species in their young state, and some also in the adult (*A. contrarius* &c.), have also vertical stripes on the upper and two spiral bands on the lower part of the whorls.

This species has hitherto only been found at a few widely distant localities.

The specimens from Guanacasta are somewhat smaller than Sowerby's type, measuring only:—long. 16, breadth 8, and aperture 9 millim.

Jaw and radula examined by myself.

42. Otostomus alternans.

Bulinus vexillum, Broderip, P. Z. S. 1832, p. 105[1]; Sowerby, Conch. Illustr., *Bulinus*, fig. 26[2].

Bulimus vexillum, Deshayes, in Lamarck's Hist. des Anim. sans Vert. ed. 2, viii. p. 272[3]; Reeve, Conch. Icon. v., *Bulimus*, t. 23. fig. 152[4] (nec Wood, 1828).

Bulimus (*Bulimulus*) *alternans*, Beck, Index Moll. p. 65[5].

Bulimus alternans, Pfr. Monogr. Helic. Vivent. ii. p. 207[6].

Bulimus (*Leptomerus*) *alternans*, Albers, Die Helic. ed. 1, p. 166[7]; Pfr. in Malak. Blätt. ii. p. 160 (1855)[8].

Orthalicus (*Leptomerus*) *alternans*, H. & A. Adams, Gen. Moll. ii. p. 156[9].

Bulimulus (*Liostracus*) *alternans*, v. Mart. in Albers's Die Helic. ed. 2, p. 213[10]; Binney, Ann.

Lyc. N. York, x. p. 305 (jaw and radula)[11]; Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 500, t. 23. fig. 5[12]; O. Stoll, Guatem. Reisen, p. 33[13].

Hab. N. Guatemala: Panzos (*Conradt*).

Central Guatemala: San Gerónimo, near Salama (*Champion*); vicinity of Guatemala City (*Stoll*[13]).

Guatemala, without nearer indication of locality (*Morelet*[12], *Sallé*[12], *Sarg*[12]).

Central Costa Rica: San José (*Pittier*); La Uruca, near San José, at an elevation of 100 metres above the sea, under dry leaves (*Biolley*); Alajuela (*Orosco*).

S. Panama: Isla del Rey (San Miguel) in the Pearl Islands, and Taboga Island, both in the Bay of Panama * (*coll. Cuming*[1–5]).

Var. *juquilensis*: fasciis angustioribus; long. 19½, diam. 9–10 millim.

Bulimus virgulatus, Tristram, P. Z. S. 1863, p. 412[14].

Bulimus alternans, var. *β*, Pfr. Monogr. Helic. Vivent. vi. p. 131[15].

Bulimulus (*Liostracus*) *alternans*, var. *β*, Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 501, t. 23. fig. 5 *a*[16].

Otostomus (*Liostracus*) *alternans*, v. Mart. Conch. Mittheil. ii. p. 192[17].

Bulimulus (*Liostracus*) *mexicanus*, var., v. Mart. in Malak. Blätt. xii. p. 24 (1865) (ex parte)[18].

Hab. S. Mexico: Juquila, in the State of Oaxaca[15] (*Boucard*[16]); Oaxaca (*Uhde*[18]).

N. Guatemala: Vera Paz (*Salvin*[14]).

Dr. O. Stoll has observed this species upon a shrub, *Baccharis salicifolia*, in company with *O. jonasi*, but much less frequent. During the dry season it conceals itself beneath stones and amongst the roots of the above-mentioned shrub, more rarely on its branches, and closes the aperture with a thin transparent epiphragma; in this state it often becomes the prey of the rapacious *Glandina aurata*, which does not ascend the shrubs. He mentions also that full-grown specimens are comparatively rare. An unusually large specimen—long. 28, diam. 14, apert. 11 millim.—found at Panzos (*Conradt*), has been sent to me by Prof. Hausknecht of Weimar; its bands are very dark, nearly black, the shell thus approaching *O. nigrofasciatus*, Pfr., from Colombia (Reeve, Conch. Icon. v., *Bulimus*, t. 55. fig. 379), but differs from it in the distinct spiral striation and the comparatively narrower bands.

Bulimus ziegleri is quoted by Fischer and Crosse as a variety of *B. alternans*, loc. cit. p. 501: concerning this name, there are several difficulties. (1) In the first description given by Dr. Pfeiffer, P. Z. S. 1846, p. 113 (repeated in Monogr. Helic. Vivent. ii. p. 175), the colour is simply said to be "albida," no bands being mentioned, and the locality is said to be "Central America," on the authority of Largilliert. As it is described as "subangulate on the last whorl" and only 21 millim. long, it may not be full-grown, as Fischer and Crosse have already suggested. I see no reason to

* Quoted as "Saboga" and "King's Island."

regard it as a variety of *O. alternans*. (2) The specimen labelled *Bulimus ziegleri* in Albers's collection, mentioned in his 'Die Heliceen,' ed. 1, p. 156, ed. 2, p. 213, is for the most part also white, but has on the upper whorls faint reddish bands, two visible on each whorl (in *O. alternans* three are visible). It is 27 millim. long and has the peristome a little expanded; it is therefore full-grown. This shell is said to have been obtained in Northern Peru, and I suppose it must belong to another species. (3) Reeve, Conch. Icon. v., *Bulimus*, t. 58. fig. 389, figured as *Bulimus ziegleri* a probably not quite adult shell, yellowish, with interrupted bands on all whorls; it may belong to the var. β of *B. ziegleri*, Pfr. (Monogr. Helic. Vivent. ii. p. 175), but he gives "Central America" as the locality, which is probably taken from Pfeiffer's first description. This figure may represent our *Otostomus emeus*. (4) The shell from Mazatlan called *Bulimus ziegleri* by Carpenter (Cat. Mazatlan Shells, p. 177) is banded; it is an unusually large specimen, about 18 millim. (0·60 inch) long and 10 millim. (0·34 inch) broad, with evanescent bands, and may belong to *O. californicus*, Reeve. This Mazatlan species has been admitted by Binney and Tryon, under the name of *Bulimulus ziegleri*, as belonging to the North-American fauna, but Binney gives no illustration of it. Concerning the localities, "Republ. Mexico" (*Liebmann*, in Pfr. Monogr. Helic. Vivent. ii. p. 175), "Chiapas" (Pfr. Monogr. Helic. Vivent. vi. p 115), and "Monte Canela, near Chicalapa" (*Sallé*, in Fisch. & Crosse, Miss. Scient. Mex., Moll. i. p. 501), I cannot make out to which of the said forms they are to be referred.

43. **Otostomus honduranus.**

Bulimus hondurasanus, Pfr. P. Z. S. 1846, p. 29[1]; Monogr. Helic. Vivent. ii. p. 209[2]; Reeve, Conch. Icon. v., *Bulimus*, t. 59. fig. 400[3].
Bulimus honduratianus, Tristram, P. Z. S. 1861, p. 230[4].
Bulimus (*Leptomerus*) *hondurasanus*, Pfr. in Malak. Blätt. ii. p. 160 (1855)[5].
Orthalicus (*Leptomerus*) *hondurasanus*, H. & A. Adams, Gen. Moll. ii. p. 156[6].
Bulimulus (*Liostracus*) *hondurasanus*, Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 503[7].

Hab. HONDURAS (*Dyson* [1–3]).

This species bears some resemblance to *O. tryoni*; but it seems to differ in the shell being rather thin and diaphanous, with the bands more narrow and four (instead of three) in number. *O. meridanus*, Pfr., from Merida, is perhaps more nearly allied to it. It may prove to be inseparable from *O. alternans*.

Tristram [4] recognized this species also among Guatemalan specimens collected by Salvin; but as I cannot find an example of it among those entrusted to me by Salvin himself, I cannot add Guatemala to its distribution.

44. **Otostomus tryoni.**

Bulimus mexicanus (Lamarck), Reeve, Conch. Icon. v., *Bulimus*, t. 40. fig. 244[1].

Drymæus mexicanus (Lamarck), Tryon, Am. Journ. Conch. iii. p. 168, t. 9 (13). fig. 5 (copy from Reeve) (1867) [2].

Bulimulus (*Thaumastus*) *tryoni*, Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 565 [3].

Hab. N.W. Mexico: Sinaloa (*Tryon* [2]).

Mexico, without nearer indication of locality (*Reeve* [1]).

Var. *pochutlensis*: fasciis nigro-fuscis, albido et pallide fulvo circumdatis.

Bulimulus tryoni, var. *β. pochutlensis*, Fisch. & Crosse, loc. cit. p. 565, t. 24. figg. 3, 3 *a* [4].

Hab. W. Mexico: Pochutla, near Chilapa, in the State of Guerrero (*Sallé* [4]).

This species is somewhat doubtful. Tryon describes [2] its colours as "white, with two brown zones on the last whorl and maculations of the same colour on the others"; this would agree with *O. palpaloensis*, Strebel, but his figure shows three continuous narrow bands on the last and one on the preceding whorl. Fischer and Crosse [3] quote Reeve's fig. 244, and also the var. β of *O. mexicanus* of Pfeiffer and myself (=*palpaloensis*); they add the variety *pochutlensis*, which differs in the proportions and colours of the shell, and bears some resemblance to *O. uhdeanus*. As I have not seen an authentic specimen of *O. tryoni*, I cannot make out more clearly the difference or identity of the said species. For *Bulimus mexicanus* of Lamarck, see page 251.

45. **Otostomus tropicalis.**

Bulimus tropicalis, Morelet, Test. Noviss. i. p. 9 (1849) [1]; Pfr. in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, *Bulimus*, p. 198, t. 55. figg. 5, 6 [2]; Monogr. Helic. Vivent. iii. p. 424 [3].

Bulimus (*Pyrgus*) *tropicalis*, Pfr. in Malak. Blätt. ii. p. 159 (1855) [4].

Bulimulus (*Liostracus*) *tropicalis*, Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 504, t. 20. figg. 7, 8 [5].

Bulimulus tropicalis, Strebel, Beitr. Mex. Land- und Süssw.-Conch. v. p. 95 [6]; Pilsbry, Proc. Acad. Phil. 1891, p. 315 [7].

Hab. Yucatan: Campeche, on the shore (*Morelet* [1]); Tabi, S. of Merida, in the interior (*F. D. Godman*, Febr. 1888); Ruins of Labna (*Pilsbry* [7]).

Strebel [6] suggests that this may be only a sinistral variety of *O. honduranus* or of an allied species; *O. honduranus*, however, is distinctly more ventricose. I have seen six specimens from Yucatan, all sinistral, agreeing with the description of *O. tropicalis* in all other respects. In all there are to be seen three brown spiral bands, exclusive of the brown coloration of the umbilicus; the uppermost bands are ordinarily more narrow than the third, and rather pale reddish.

46. **Otostomus uhdeanus.** (Tab. XV. figg. 1–6.)

Bulimulus (*Mesembrinus*) *uhdeanus*, v. Mart. in Monatsber. Akad. Wiss. Berl. 1863, p. 541 [1]; Malak. Blätt. xii. p. 25, t. 1. figg. 4, 5 (1865) [2]; Pfr. Monogr. Helic. Vivent. vi. p. 114 [3].

Bulimulus (*Scutalus*) *uhdeanus*, Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 530, t. 21. figg. 4, 4 *a* [4].

Bulimulus uhdeanus, Strebel, Beitr. Mex. Land- und Süssw.-Conch. v. p. 90, t. 11. figg. 11 *a*, *b* [5].

A. *typicus*: long. 22, diam. et apert. 10 millim.

a: albidus, fasciis 3–5 pallide fulvis, æqualibus. (Fig. 1.)
(Fisch. & Crosse, loc. cit. t. 21. figg. 4, 4 *a*.)

b: albidus, fasciis 5 pallide fulvis, fusco-maculatis. (Fig. 3.)

c: unicolor, pallide fulvus. (Fig. 2.)

Hab. MEXICO, without nearer indication of locality (*Uhde* [1–3]).
E. MEXICO: Aculcingo, State of Vera Cruz, south of Orizaba (*Boucard* [4]).
W. MEXICO: Sayula, State of Jalisco (*Höge*).

B. *cuernavacensis*: major, fasciis magis distinctis, latiusculis; long. 29, diam. 15, apert. 13 millim. (Fig. 4.)

Bulimulus (*Scutalus*) *cuernavacensis*, Crosse & Fisch. in Journ. de Conch. xxii. p. 283 (1874) [6]; Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 532, t. 23. figg. 11, 11 *a* (young?) [7].
Bulimus cuernavacensis, Pfr. Monogr. Helic. Vivent. viii. p. 152 [8].
Bulimulus cuernavacensis, Strebel, Beitr. Mex. Land- und Süssw.-Conch. v. p. 65, t. 12. fig. 17 [9].

Hab. CENTRAL MEXICO: Cuernavaca (*Boucard* [6 7]).
E. MEXICO: Orizaba and Maltrata, a little west of Orizaba (*Höge*).

C. *tepicensis*: minor, anfractibus superioribus fasciatis, mediis maculatis, ultimo pallido, basi fascia una lata diluta; long. 18, diam. 9, apert. $8\frac{1}{2}$ millim. (Fig. 5.)

Hab. W. MEXICO: Tepic, State of Jalisco (*Höge* [9]).

D. *borealis*: minimus, griseo-albidus, superne seriebus macularum 1–3, inferne fascia una lata pallida; long. 15, diam. 8, apert. 7 millim. (Fig. 6.)

Hab. N.W. MEXICO: Ventanas, State of Durango, at an elevation of 2000 feet above the sea (*Forrer*).

The first one and a half whorls are unicolorous, yellow, and finely reticulated. The typical form may be described as white with fawn-coloured bands, or fawn-coloured with white bands: the latter definition is perhaps the best, as the fawn occupies a greater part of the surface, and is the only colour present in subvar. *c*, and I have used it in my earlier descriptions [1 2]. But if we examine the var. *cuernavacensis*, and the majority of the other species of this genus, we shall, perhaps, prefer to regard the coloration as white with fawn bands; but then we must admit that the uppermost band reaches the suture and the lowest one the umbilicus, and that the unicolorous subvariety *c* is produced by all the bands uniting together. The variation in the number of bands is caused by the uppermost disappearing, and by the fourth and fifth uniting into one.

This species, as regards the shell, bears some resemblance to *Bulimulus exilis*, Gm. (*guadelupensis*, Brug.), the type of the genus *Bulimulus*; but having examined the radula of *O. uhdeanus*, I have found that it agrees better with that of *Otostomus*, the median tooth being also remarkably smaller than the neighbouring ones.

47. Otostomus multilineatus.

Bulimus multilineatus, Say, Journ. Acad. Phil. v. p. 120 (1825)[1]; Pfr. Monogr. Helic. Vivent. ii. p. 204[2].

Mesembrinus multilineatus, Tryon, Am. Journ. Conch. iii. p. 169, t. 9 (13). figg. 11, 12[3].

Bulimulus (*Mesembrinus*) *multilineatus*, Binney & Bland, Land and Fresh-water Shells of N. Am. i. p. 197, fig. 344[4]; Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 545[5].

Bulimulus multilineatus, Binney, Terr. air-breath. Moll. of N. Am. v. p. 395[6]; Manual of Am. Land-Shells, p. 404, fig. 443[7].

Bulimus menkei, Gruner in Wiegm. Arch. f. Naturg. 1841, p. 277, t. 11. fig. 2[8]; Pfr. Monogr. Helic. Vivent. ii. p. 176[9]; in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, *Bulimus*, p. 190, t. 49. figg. 19, 20[10].

Bulimus (*Mesembrinus*) *menkei*, Albers, Die Helic. ed. 1, p. 157[11]; Pfr. in Malak. Blätt. ii. p. 158 (1855)[12].

Bulimulus (*Mesembrinus*) *menkei*, v. Mart. in Albers's Die Helic. ed. 2, p. 214[13].

Otostomus (*Mesembrinus*) *menkei*, v. Mart. Binnenmoll. Venezuela's, p. 28[14].

Bulimus sisalensis, Morelet, Test. Noviss. i. p. 9 (1849)[15]; ii. p. 27 (*menkei*?)[16].

Bulimus venosus, Reeve, Conch. Icon. v., *Bulimus*, t. 45. fig. 285[17].

Bulimus virgulatus (Férussac), Leidy, in Binney's Terr. air-breath. Moll. of N. Am. i. p. 259, t. 15. figg. 7, 8 (anatomy) (1851)[18]; Binney, op. cit. ii. p. 278, t. 58[19].

Hab. North America: Eastern Florida (*Say* [1 2]); Key West &c.[4 6 7].
Yucatan: Sisal, on sandy ground (*Morelet* [5 15 16]).
Colombia: Santa Marta, Magdalena, and Bambo Bay[4 6 7].
Venezuela: Maracaibo and Puerto Cabello (*Swift*[4 6 7]); Angostura, on the borders of the R. Orinoco ([8–10 14]).

I have seen no specimen from Guatemala, but Morelet's description[15] agrees so well with my Venezuelan examples, and with Binney's figures of Florida ones, that I cannot distinguish the Yucatan shell even as a variety. As it is not known from E. Mexico, it cannot be said to be distributed generally along the shores of the Caribbean Sea.

48. Otostomus heterogeneus.

Bulimus heterogeneus, Pfr. in Malak. Blätt. xiii. p. 118 (1866)[1]; Monogr. Helic. Vivent. vi. p. 118[2].

Bulimulus (*Liostracus*) *heterogeneus*, Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 506[3].

Bulimulus heterogenus, Strebel, Beitr. Mex. Land- und Süssw.-Conch. iv. t. 6. figg. 18 *a*, *b*; v. p. 92[4].

Hab. W. Mexico: Tepic, State of Jalisco (*Höge*).
E. Mexico: Mirador, Palo Gacho, on the road from Vera Cruz to Jalapa, and Rinconada near the same place (*Strebel*[4]); Vera Cruz (*Berendt* [1–3]).

This species approaches *O. livescens*, as Strebel has already stated[4], and *O. discrepans*. From *O. livescens* it differs in the somewhat more convex whorls, the less tapering

spire, the more yellowish hue of the white colour, the subangular last whorl, and the very slight turning out of the apertural margin; this last-mentioned character proves it to be adult, although the shell has one whorl less than that of *O. livescens*. The stripes are pale brown, disposed at unequal intervals, and very variable; they are seen chiefly on the whorl before the last, sometimes also on the last, while on the other whorls spiral rows of spots, or even bands, also pale, however, predominate. On account of some of the whorls being differently painted to the others, Dr. Pfeiffer seems to have used the name "*heterogeneus*," which at first leads one to suppose that the species possesses much more peculiar and unusual characters.

49. **Otostomus semipellucidus.** (Tab. XV. fig. 10.)

Bulimus semipellucidus, Tristram, P. Z. S. 1861, p. 230, t. 26. fig. 8 [1]; Pfr. Monogr. Helic. Vivent. vi. p. 22 [2].

Bulimulus (*Liostracus*) *semipellucidus*, Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 507 [3].

Hab. Guatemala (*Salvin*[1–3]).

N.W. Costa Rica: Guanacasta, in the Bay of Salinas (*Pittier*).

N.E. Costa Rica: Puerto Viejo, on the Rio Sarapiqui (*Biolley*).

Central Costa Rica: Alajuela (*Orosco*).

I am rather inclined to think that this is an albino variety of *O. discrepans*. The specimen from Guanacasta, from which our figure is taken, has a few brownish oblique stripes on the whorl before the last, whereas in all other respects it agrees with the Rev. H. B. Tristram's description and figure; but as the whorls are a little more convex than in *O. discrepans*, and the umbilical cleft completely closed, I dare not assert it positively. Tristram's figure [1] is somewhat magnified, as is proved by his statement in the text, that the length of the shell is 18 millim. He gives the breadth as 8 millim.; but this is too narrow, as by reducing the measurements of his figure we find $9\frac{1}{2}$ millim. as the breadth of the last whorl. Probably he has, judging from the example of Dr. Pfeiffer, measured the breadth just above the upper edge of the aperture, which is in reality the breadth of the penultimate whorl. This must be kept in mind when comparing my measurements with those given by Dr. Pfeiffer.

The Costa Rica specimens have stripes only on the upper whorls and also here less numerous than in the type. Fischer and Crosse reproduce the original description [1] and add Dueñas as a locality. No dependence, however, can be placed upon this statement, as many of Mr. Salvin's shells were obtained in the vicinity of Coban, Vera Paz.

50. **Otostomus panamensis.**

Bulinus panamensis, Broderip, P. Z. S. 1833, p. 105 [1]; Sowerby, Conch. Illustr., *Bulinus*, fig. 25 [2].

Bulimus panamensis, Deshayes, in Lamarck's Hist. Nat. des Anim. sans Vert. ed. 2, viii. p. 273 [3]; Pfr. Monogr. Helic. Vivent. ii. p. 206 [4]; Reeve, Conch. Icon. v., *Bulimus*, t. 13. fig. 70 [5].

Bulimus (*Bulimulus*) *panamensis*, Beck, Ind. Moll. p. 67 [6].

Bulimus (*Leptomerus*) *panamensis*, Albers, Die Helic. ed. 1, p. 166 [7]; Pfr. in Malak. Blätt. ii. p. 160 (1855) [8].

Orthalicus (*Leptomerus*) *panamensis*, H. & A. Adams, Gen. Moll. ii. p. 156 [9].

Hab. S. Panama: Isla del Rey (San Miguel), one of the Pearl Islands, and Taboga Island, both in the Bay of Panama *, on the trunks of large trees (*Cuming* [1 4 5]).

This species is described by Broderip [1] as unicolorous, but Reeve's [5] figure shows conspicuously darker reddish stripes. Not having seen a specimen, I am unable to judge as to its real affinities; but its whole appearance is more like that of *Otostomus* than of the section *Leptomerus* of *Bulimulus*.

Doubtful Species which may belong to this genus.

1. *Bulimus dominicus*, Reeve, Conch. Icon. v. t. 78. fig. 659 [1]; Pfr. Monogr. Helic. Vivent. iii. p. 410 [2]; iv. p. 469 [3]; vi. p. 112 [4].—*Bulimus* (*Leptomerus*) *dominicus*, Pfr. in Malak. Blätt. ii. p. 159 (1855) [5].—*Bulimulus* (*Scutalus*) *dominicus*, Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 540 [6].—*Bulimulus dominicus*, Strebel, Beitr. Mex. Land- und Süssw.-Conch. iv. t. 6. fig. 17; v. p. 94 [7]; Crosse, in Journ. de Conch. xxxix. p. 128 (1891) [8].

Originally stated as coming from San Domingo=Haiti [1 2], then identified with a shell found in East Mexico at Mirador by Berendt [4], and at Callejon de la Zamorana near Vera Cruz by Strebel [7], in South-east Mexico at Tabasco by Berendt [4], and in Chiapas by Ghiesbreght [3 5].

It is improbable that species of this genus should be common to Haiti and Mexico, but I cannot make out whether Reeve's original statement [1] is erroneous, as Fischer [6], Strebel [7], and Crosse [8] are inclined to think, or Pfeiffer and subsequent authors are wrong in identifying them. Perhaps the Mexican examples may be young specimens of *Otostomus emeus*.

2. *Bulimulus albostriatus*, Strebel, Beitr. Mex. Land- und Süssw.-Conch. v. p. 94, t. 6. fig. 3, probably from Tehuantepec, perhaps collected by Dr. Sumichrast, has also the appearance of being a young shell.

3. *Bulimus hachensis*, Reeve, Conch. Icon. v., *Bulimus*, t. 85. fig. 627 [1]; Pfr. Monogr. Helic. Vivent. iii. p. 421 [2].—From Rio Hacha, in Guatemala, according to Reeve: I know only a Rio Hacha in Colombia. *B. hachensis* bears no near resemblance to any Guatemalan species known to me; but to judge from the "delicate" appearance and rosy-yellow colour of the shell it may perhaps belong to the group of *O. sulfureus*.

* Quoted as "Saboga" and "King's Island."

BULIMULUS.

Bulimulus, Leach, Zool. Miscell. i. p. 41 (1815)[1]; v. Martens, in Albers's Die Helic. ed. 2, p. 209 (1860) (ex parte)[2]; Die Binnenmoll. Venezuela's, p. 21 (1873)[3]; Conch. Mittheil. ii. p. 194[4]; Semper, Reisen in Archip. der Philippinen, Landschnecken, iii. p. 153[5].

Bulimulus, subgen. *Orthotomium*, Fischer & Crosse, Miss. Scient. Mex., Mollusca, i. p. 473 (1875) (part.)[6].

Bulimulus, sectt. A–C, Strebel, Beitr. Mex. Land- und Süssw.-Conch. v. pp. 45, 46[7].

Shell oblong, generally with straight edge to the aperture, and unicolorous, not shining; columella not notched at the base. Jaw composed of few plates, with vertical lateral edges. Teeth of the radula in straight, transverse rows, the central tooth not smaller than the others; marginal teeth generally bicuspid.

Lives by preference on the ground or on low shrubs.

This genus is nearly allied to the preceding, and from the shell alone it is often impossible to decide whether a species belongs to the one or to the other. The name *Bulimulus* was first proposed for the shell of *Helix exilis*, Gm. (*B. acutus*, Leach, *guadelupensis*, Brug.), subsequently extended by Beck (Index Moll. 1838) to include a large number of South-American species and a few Indian ones. The structure of the jaw and radula was first proposed by myself[2] as a generic character, with the view of including only American species in this genus, but, in a somewhat extended sense, comprising also the *Otostomi*. Afterwards, as the jaw and radula of a greater number of species became known, *Bulimulus* and *Otostomus* were distinguished as two allied, but distinct, genera by myself[3 4], Semper[5], and, under other names as chief subgeneric divisions, by Fischer and Crosse[6].

This genus ranges from the southern half of North America (Kentucky—*B. dealbatus*, Say) to the Argentine Republic (*B. famatinus*, Döring), but its species are not so numerous as those of *Otostomus*. The Mexican and Central-American species belong to the following four groups or subgenera:—

1. *Rhabdotus*, Albers (Die Helic. ed. 1), limited by v. Martens, Conch. Mittheil. ii. p. 197; type *B. dealbatus*, Say.—Shell oval or oblong, white, unicolorous, or with brown or grey streaks; peristome somewhat thickened. *B. schiedeanus* and *alternatus*: Centr., N., and N.E. Mexico (S.W. Mexico?).
2. *Globulinus*, Fisch. & Cr.—Shell shortened oval, yellowish, nearly unicolorous. *B. sufflatus*: N.W. Mexico.
3. *Peronæus*, Albers. — Shell very elongated, white, peristome simple. *B. durangoanus* and ?*gruneri*: N. Mexico; nearest allied to *B. artemisiæ*, A. Gould, from the peninsula of California.
4. *Leptomerus*, Albers.—Shell ovate or oblong, thin, brownish, unicolorous, peristome simple. *B. corneus, unicolor, sarcodes, coriaceus, inermis, translucens, dysoni*, and ?*umbraticus*: E. & S.W. Mexico—Panama.

The subgenera *Peronæus* and *Leptomerus* are placed by Fischer and Crosse in their division *Goniognathmus*, our genus *Otostomus*; but the jaw and radula of the typical

species of *Leptomerus*, *B. limnæoides*, Fér., and of two other allied species, *B. fraterculus*, Fér., and *B. sepulcralis*, Poey [described by Binney, Ann. Lyceum N. York, x. p. 347 (1873), xi. p. 186, t. 16. figg. A, B (1875), and by Dr. Pfeffer, in Strebel's Beitr. Mex. Land- und Süssw.-Conch. v. p. 56, t. 13. fig. 1], exhibit the distinctive character of this genus. As regards *Peronæus*, the radula of the Mexican and Californian species, as well as that of the typical species from Chili and Bolivia, has not yet been examined so far as I know; one S.-American species, however, *B. famatinus*, Döring, from the Argentine Republic, which may belong to this subgenus, has the radula and jaw of *Bulimulus*, according to the description given by Döring, Boletin de la Acad. de Cordoba, iii. p. 64 (1879).

1. **Bulimulus schiedeanus.** (Tab. XV. figg. 12–23.)

Bulimus schiedeanus, Pfr. Symb. Hist. Helic. i. p. 43 (1841) [1]; in Philippi's Abbild. neuer Conch. i. p. 56, *Bulimus*, t. 1. fig. 12 [2]; Monogr. Helic. Vivent. ii. p. 187 [3]; in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, *Bulimus*, p. 160, t. 46. figg. 3, 4 [4]; Reeve, Conch. Icon. v., *Bulimus*, t. 54. fig. 361 [5]; Binney, Terr. air-breath. Moll. of N. Am. iv. p. 129, t. 80. figg. 8 (var.), 15 [6].

Bulimus (*Mesembrinus*) *schiedeanus*, Albers, Die Helic. ed. 1, p. 157 [7]; Pfr. in Malak. Blätt. ii. p. 158 (1855) [8].

Orthalicus (*Mesembrinus*) *schiedeanus*, H. & A. Adams, Gen. Moll. ii. p. 157 [9].

Bulimulus (*Thaumastus*) *schiedeanus*, v. Mart. in Albers's Die Helic. ed. 2, p. 215 [10]; Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 563, t. 24. fig. 2 [11].

Bulimulus (*Scutalus*) *schiedeanus*, v. Mart. in Malak. Blätt. xii. p. 30 (1865) [12].

Thaumastus schiedeanus, Tryon, Am. Journ. Conch. iii. p. 172, t. 10 (14). figg. 1, 4 (1868) [13].

Bulimulus schiedeanus, Binney & Bland, Land and Fresh-water Shells of N. Am. i. p. 204, fig. 352 [14]; Binney, Terr. air-breath. Moll. of N. Am. v. (Bull. Mus. Comp. Zool. Harv. Coll. iv. p. 391), fig. 276 (1878) [15]; Bull. Mus. Comp. Zool. Harv. Coll. v. p. 338, fig. 1 E (1879) [16]; Manual of Am. Land-Shells, p. 399, fig. 437 [17]; Strebel, Beitr. Mex. Land- und Süssw.-Conch. iv. t. 6. fig. 19; v. p. 57, t. 11. figg. 16, 17 [18].

Bulimulus schiedeanus, var. *mooreanus*, Binney & Bland, Land and Fresh-water Shells of N. Am. i. p. 205, fig. 353 [19].

Bulimulus schiedeanus, var. *mooreanus*, var., Binney & Bland, loc. cit. fig. 355 [20].

Bulimus xanthostomus, Wiegm. in Mus. Berol. [21].

Bulimus niveus, Hegewisch, in litt. [22].

Bulimus candidissimus, Nyst, in litt. [23].

Bulimus dealbatus, var., Binney, Terr. air-breath. Moll. of N. Am. ii. t. 5, *b* (the uppermost and lowest figures) [24].

Hab. North America: Texas [6 13]; Washington County [6 14 19 20], very common [15 17], De Witt County [6 19], Brownsville, Leon [19].

N.E. Mexico: State of Tamaulipas [14]; neighbourhood of Texas [6 15 17].

N. Mexico: Villa Lerdo in Durango (*Höge*).

Central Mexico: Tehuacan, in the State of Puebla (*Uhde* [12]; *Hegewisch*; *Höge*, abundantly); Laguna de Chapala, in the State of Jalisco (*Deppe* [12]).

Comparative Table of the Species of the Genus *Bulimulus*.

Nomen.	Peristoma.	Figura.	Sculptura.	Coloratio.	Umbilicus.	Long.	Diam.	Apert.	Patria.
schiedeanus, *Pfr.*	rectum, crassiusculum.	acute ovata vel oblongo-ovata.	ruditer striata.	alba, fauce flavida.	perforatus.	mm. 36 27 24	mm. 20 15 15	mm. 18 11 11½	Texas, N.E., N., & Central Mexico.
——, var. patriarcha, *Binn.*	,,	acute ovata.	modice striata.	alba, sæpius griseo-picta, fauce fusca.	,,	35	21	19	Texas, N.E. Mexico.
alternatus, *Say*	vix expansum, intus labiatum, columella 1-plicata.	ovato-oblonga.	lævigata, nitidula.	violaceo - cornea, strigis albis sinuatis marmorata.	,,	29	12½	14	Louisiana, Texas, N.E. & ? S.W. Mexico.
sufflatus, *Gould*.....	rectum, crassiusculum, marg. columell. dilatato.	obese ovata.	latiuscule striatula, nitidula.	pallide flavida, strigis raris fuscis angustis.	,,	34 27	19½ 14½	19 16	Lower California, W. Mexico.
gruneri, *Pfr.*	rectum.	conico-oblonga.	lævigata, nitidula.	alba, unicolor vel strigata vel maculata.	anguste perforatus.	28	10	10	Mexico ?
durangoanus, *v. Mart.* ...	,,	fusiformi-elongata.	irregulariter striatula, nitidula.	alba, maculis et strigis brevibus diaphano-griseis.	perforatus.	15	6	6½	N. Mexico.
corneus, *Sowerby*	simplex, margine columellari latiusculo.	conico-ovata, anfr. convexis.	verticaliter subtilissime striata.	griseo - cornea, sutura pallida.	latiusculus.	16	8	7	W., S.W., & E. Guatemala, N.W., N.E. & S.E. Nicaragua, N.W., Centr., & E. Costa Rica.
——, var. nubeculatus, *Pfr.*	,,	ovata, anfr. convexis.	sublævigata ?	pallide cornea, saturatius nubeculata.	,,	16	9	7½	Central America.
——, var. minor	,,	,,	,,	griseo-cornea, unicolor.	,,	12	8	7	E. Mexico.

unicolor, *Sowerby*	simplex, marg. columell. triangulari.	oblongo - conica, anfr. convexiusculis.	leviter striatula, diaphana, nitidula.	pallide cornea, unicolor.	aperte perforatus.	16	8½	7	S. Panama.
——, var. petenensis, *Morel.*	,,	,,	subrugata, tenuiuscula.	cornea, fusco-nubeculata.	perforatus.	19	8	8½	N. Guatemala.
——, var. istapensis, *Fisch. & Cr.*	,,	,,	striatula, nitidula.	sordide albida, lineolis spiralibus diaphanis.	anguste perforatus.	14½	7	6½	S. Guatemala.
sarcodes, *Pfr.*	simplex.	conico-ovata, sat obesa.	ruguloso - striata, decussata.	pallide cornea, incarnato - tincta, substrigata.	aperte perforatus.	19 17½	9 8	8 8	Honduras.
coriaceus, *Pfr.*	,,	ovata, anfr. planiusculis.	leviter striatula.	corneo-fusca.	perforatus.	18 14	10 8½	8¾ 7	E., S.E, & S.W. Mexico.
——, var. berendti, *Pfr.*	,,	,,	,,	,,	,,	18	9½	8½	E., S.E., & S.W. Mexico.
inermis, *Morel.*	,,	subturrita.	minute striata, nitidula.	fusco-cornea.	latiusculus.	9	4	3	Yucatan.
——, var. major	,,	,,	,,	,,	,,	13½	6	5	N. Guatemala.
translucens, *Brod.*.....	,,	ovato-oblonga.	lævigata, tenuissima.	pallide flavescens.	subperforatus.	21	11½	10½	S. Panama.
dysoni, *Pfr.*	,,	conico-oblonga, anfr. planiusculis, basi subangulata.	irregulariter striatula.	corneo-fusca, semipellucida.	anguste perforatus.	23 20	11 9½	9 9	Yucatan, Honduras, Central Nicaragua.
——, var. ignavus, *Reeve.*	,,	oblongo-conica.	subtiliter striatula.	sordide cornea.	subperforatus.	17	9	7	Yucatan, ? N. Guatemala.
? umbraticus, *Reeve*	,,	subturrito-conica.	creberrime elevato-striatula.	albida, anfractibus superioribus fusco-strigatis.	,,	17	8½	7¼	Central America.

Mexico [3–6 13], without nearer indication of locality (*Schiede* [1 2]; *Hegewisch* [2 12]; *Uhde* [12]; *David, in coll. Dunker*).

Var. *patriarcha*.

Bulimus patriarcha, Binney, Proc. Acad. Phil. 1858, p. 116 [25]; Terr. air-breath. Moll. of N. Am. iv. p. 130, t. 80. fig. 13 [26]; Pfr. Monogr. Helic. Vivent. vi. p. 143 [27].

Thaumastus patriarcha, Tryon, Am. Journ. Conch. iii. p. 171, t. 9 (13). fig. 15 [28].

Bulimulus patriarcha, Binney & Bland, Land and Fresh-water Shells of N. Am. i. p. 200, fig. 346 [29]; Binney, Terr. air-breath. Moll. of N. Am. v. p. 388, fig. 270 [30]; Manual of Am. Land-Shells, p. 396, fig. 431 [31].

Bulimulus (*Thaumastus*) *patriarcha*, Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 564 [32].

Hab. North America: Texas [26 28 30 31].

N.E. Mexico: Buenavista (N.W. of Linares, in the State of Nuevo Leon) (*Berlandière* [25 26 29 31], *Couch* [29]).

Mexico, without nearer indication of locality [28].

Pfeiffer [2] states that the shells of this species are pierced and strung by the peasants, and sold in Mexico.

I have examined 352 specimens from various localities, 335 of which are from Tehuacan, collected either by Höge or Uhde, forty-six belonging to the larger and smoother variety; none of them show the well-defined columellar tubercle of *B. alternatus*. The greatest length of the shell is 30 millim., the greatest diameter 17, but these dimensions are not found united in any specimen; the proportion of the diameter to the length of the shell in the same specimen varies from 1 : $2\frac{1}{7}$ to 1 : $1\frac{3}{5}$, that of the aperture to the whole length from 1 : 2 to 1 : $2\frac{1}{3}$. These differences are chiefly caused by the degree of involution: if the following whorl envelops a little more of the preceding, it extends nearer to the periphery, and the shell becomes broader and more ventricose, and the aperture larger; if the following whorl envelops a smaller portion of the preceding, it extends further downwards, and the shell becomes more elongate and the aperture proportionately smaller. The most elongated specimens somewhat approach *B. callosus*, Philippi, from Atacama; but they show neither the rough sculpture, the blunt apex, nor the thick parietal callus in the aperture of that species. I have figured some of the different forms, all collected at Tehuacan by Höge. The colour externally is opaque white, without stripes, inside the aperture is generally ochraceous, more rarely white.

The variety is on the average larger, with the shell more regularly ovate, though not very different in size and form; its surface is smoother, even a little shining, generally also equally white, but in some specimens with a few scattered, pale grey or even pale brownish stripes, inside of mouth more deeply brown. In most of these respects it approaches *B. alternatus*. I have seen forty-seven specimens of it from Tehuacan: the longest of them measures 36 millim. in length, the broadest 18

millim. in breadth; the proportion of the diameter to the length in the same specimen varies from 1 : $1\frac{3}{10}$ to 1 : $1\frac{3}{4}$; the aperture occupies in all specimens nearly one half of the whole length of the shell. In a few specimens the uppermost whorls are marbled with diaphanous grey and opaque white; all the others are unicolorous white.

The specimens from Durango are somewhat more oval than conical, smoother, and not purely white, but marked with very pale brownish stripes; they have the interior of the aperture very vividly brown. By these characters they form a transition to *B. alternatus*; but they are entirely without the columellar tubercle of that species.

Two others, resembling these but rather larger, collected also by Höge, are simply labelled "Mexico," without more definite locality; one of them is figured (fig. 18).

The figures 20–22 are taken from deformed examples, fig. 23 from a young one.

2. **Bulimulus alternatus.** (Tab. XV. figg. 24–26.)

Bulimus alternatus, Say, New Harmony Disseminator, Dec. 1830, p. 25 (ed. Binney, p. 39) [1]; Pfr. Monogr. Helic. Vivent. ii. p. 221 [2]; Binney, Terr. air-breath. Moll. of N. Am. iv. p. 126, t. 80. figg. 1, 3 (copy of Say's drawing) [3].

Thaumastus alternatus, Tryon, Am. Journ. Conch. iii. p. 171, t. 9 (13). fig. 6, t. 10 (14). fig. 10 [4].

Bulimulus alternatus, Binney & Bland, Land and Fresh-water Shells of N. Am. i. pp. 200–204, figg. 347–350, 351 (radula) [5]; Binney, Terr. air-breath. Moll. of N. Am. v. pp. 388–391 (with the same figures repeated) [6]; Cockerell, Journ. de Conch. xxxix. p. 23 (1891) [7]; Stearns, in Proc. Un. St. Nat. Mus. xiv. p. 99 (1891) [8].

Bulimulus (*Thaumastus*) *alternatus*, Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 561, t. 24. fig. 1 (copy of Say's original drawing) [9]; Bland & Binney, Am. Journ. Conch. vii. p. 181 [10].

Bulimus lactarius (Menke), Pfr. Symb. Hist. Helic. iii. p. 85 (1846) [11]; Pfr. Monogr. Helic. Vivent. ii. p. 187 [12]; Reeve, Conch. Icon. v., *Bulimus*, t. 37. fig. 217 *b* [13].

Bulimus (*Scutalus*) *mariæ*, Albers, Die Helic. ed. 1, pp. 160, 162 [14].

Bulimus mariæ, Pfr. Monogr. Helic. Vivent. iii. p. 350 [15]; in Martini & Chemnitz, Syst. Conch.-Cab., ed. 2, *Bulimus*, p. 157, t. 48. figg. 7, 8 [16]; P. Z. S. 1858, p. 23 [17].

Bulimus (*Ena*) *mariæ*, Pfr. in Malak. Blätt. xii. p. 154 (1855) [18].

Orthalicus (*Scutalus*) *mariæ*, H. & A. Adams, Gen. Moll. ii. p. 158 [19].

Bulimulus (*Thaumastus*) *mariæ*, v. Mart. in Albers's Die Helic. ed. 2, p. 215 [20].

Thaumastus mariæ, Tryon, Am. Journ. Conch. iii. p. 172, t. 10 (14). fig. 3 [21].

Bulimus dealbatus, var., Binney, Terr. air-breath. Moll. of N. Am. ii. p. 276, t. 51 *a* (uppermost and lowest figures), t. 5 *b* (the three middle figures) [22].

Hab. North America: Louisiana [5 7]; Texas [4 6 8 17 20 21], especially at Leon [5] and San Pedro [5]; Tableland west of Fort Clark [5] (on the Rio San Pedro, near the frontier of the Mexican State of Coahuila).

N.E. Mexico: State of Tamaulipas [5], especially at Matamoros [5], found in great numbers on bushes [6] (*Couch*).

? S.W. Mexico: Isthmus of Tehuantepec [6 10].

Mexico, without nearer indication of locality [1 6].

Having examined a number of specimens of "*B. mariæ*" from Texas in German collections, I can fully endorse Binney's remarks[5]:—"This species is readily distinguished from the allied forms by its greater solidity, its highly polished surface, its more elongated form, its dark-coloured aperture, bordered with the white internal margin of the peritreme, and the tooth-like callus upon the upper portion of the columella." But it is somewhat strange that Say himself[1] does not mention the conspicuous brown colour of the interior of the aperture, but says only "labrum .... within white, with a perlaceous tinge," which is true as regards a zone of 2 millim. in breadth immediately behind the margin of the aperture; all the rest of the description, and especially "the thickened line or rib on the inner submargin," agrees well with our species. Most specimens show, indeed, more or less distinctly, a peculiar circumscribed tubercle in the middle of the columellar margin, which is seen neither in *B. dealbatus* nor in *B. schiedeanus*; but in some this tubercle is less conspicuous, which may account for Cockerell's distinction of varieties with and without tooth on the columella[7].

Bulimus lactarius (Menke) was described by Pfeiffer[11] at a time when *B. alternatus* was not known to him by autopsy (Symb. Hist. Helic. iii. p. 52); it was subsequently identified with *B. alternatus* by the author himself (Monogr. Helic. Vivent. vi. p. 122, and viii. p. 158). His original description[11] agrees very well with our species, except that the tubercle on the columella is not mentioned; but this is sometimes very small, and only visible when one looks obliquely into the aperture. Reeve's figure 217*a* agrees better with *B. schiedeanus*, var. *patriarcha*; and the same is probably meant by H. and A. Adams, who place *lactarius* with *schiedeanus* in their subgenus *Mesembrinus* (Gen. Moll. ii. p. 157). Cockerell[7] distinguishes somewhat artificially the following varieties:—(1) with grey or brownish streaks, (*a*) without columellar tooth (*alternatus*, Say), (*b*) with columellar tooth (*mariæ*, Alb.); (2) one-coloured, white, (*a*) without columellar tooth (*albidus*, Taylor) (not described), (*b*) with columellar tooth (*binneyanus*, Binn.).

The locality "Tehuantepec" is so far distant from the others that I should have excluded it altogether if it had not been recorded by Bland and Binney[10], to whom we must give full credit for their knowledge of this species. Forbes (P. Z. S. 1850, p. 54) mentions it even from Panama; but in this case the correctness of the determination is not so trustworthy.

The name "*mariæ*" was given to this shell by Albers[14] on account of his recognition of it as a supposed new species on the twelfth birthday of his daughter Mary.

3. **Bulimulus sufflatus.**

Bulimulus vesicalis, A. Gould, Bost. Journ. Nat. Hist. vi. p. 375, t. 14. fig. 1 (1853)[1]; Carpenter, P. Z. S. 1856, p. 203[2]; Gabb, Am. Journ. Conch. iii. p. 237, t. 16. fig. 6 (1868)[3]; Pfr. Monogr. Helic. Vivent. iv. p. 467[4] [not Pfr. Monogr. Helic. Vivent. iii. p. 654 (1853), and

in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, *Bulimus*, t. 70. figg. 23, 24—a Brazilian species].

Bulimus sufflatus (Gould), Binney, Proc. Acad. Phil. xi. p. 188 (1859)[5]; Terr. air-breath. Moll. of N. Am. iv. p. 25[6]; Crosse, Journ. de Conch. xix. p. 207 (1871)[7].

Mormus sufflatus, Tryon, Am. Journ. Conch. iii. p. 172, t. 10 (14). fig. 6 (1868)[8].

Bulimulus (*Mormus*) *sufflatus*, Binney & Bland, Land and Fresh-water Shells of N. Am. i. p. 206, fig. 356[9]; Binney, Terr. air-breath. Moll. of N. Am. v. p. 20[10]; Proc. Acad. Phil. 1875, p. 224, t. 16. fig. 12 (jaw)[11]; Am. Journ. Conch. vi. p. 209, t. 9. figg. 8 (jaw), 13 (radula)[12].

Bulimulus (*Globulinus*) *sufflatus*, Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 568, t. 19. figg. 17, 18 (jaw and radula), t. 20. figg. 23–25 (shell)[13].

Bulimus juarezi, Pfr. P. Z. S. 1865, p. 832[14]; Novit. Conch. ii. p. 280, t. 69. figg. 1, 2[15]; Monogr. Helic. Vivent. vi. p. 123[16].

Hab. North America: Lower California [1–4 6], lowlands about La Paz [3].
W. Mexico: Pacific region [14–16] (*Frick* [13]).

4. Bulimulus gruneri.

Bulimus gruneri, Pfr. P. Z. S. 1846, p. 30[1]; Monogr. Helic. Vivent. ii. p. 213[2]; in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, *Bulimus*, p. 62, t. 62. figg. 11, 12[3]; Reeve, Conch. Icon. v., *Bulimus*, t. 51. fig. 332[4].

Bulimus (*Liostracus*) *gruneri*, Albers, Die Helic. ed. 1, p. 156[5].

Bulimus (*Pyrgus*) *gruneri*, Pfr. in Malak. Blätt. ii. p. 159 (1855)[6].

Otostomus (*Leiostracus*) *gruneri*, H. & A. Adams, Gen. Moll. ii. p. 151[7].

Bulimulus (*Mesembrinus*) *gruneri*, Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 547[8].

Bulimulus gruneri, Strebel, Beitr. Mex. Land- und Süssw.-Conch. v. p. 92, t. 6. fig. 1 (1 *a*, 1 *b*)[9].

Hab. Mexico, without nearer indication of locality [2–4 8 9] (*coll. Cuming* [1]).
? Ecuador: Soganovo (*Reiss* [9]).

This species does not seem to have been again found in Mexico, all descriptions, except Strebel's [9], merely repeating Pfeiffer's statement [1]. Reeve's figure [4] differs from that given by Pfeiffer [3] not only in form but in having some dark stripes and spots. Strebel gives a new description and figure (fig. 1)[9] from a specimen sent to him by Pfeiffer himself, which, however, does not accord with the original description [1]; and he adds to it two specimens (figg. 1 *a*, 1 *b*) collected in Ecuador by Dr. Reiss. The Mexican habitat therefore requires corroboration. Of all the allied Mexican species known to me, Strebel's figures resemble only *B. durangoanus*, which is, however, much smaller, and *Otostomus heterogeneus*, Pfr.

Named in honour of Herr Gruner, once an eminent collector at Bremen: the spelling *grüneri* or *grueneri* is erroneous; the *u* in this case should be pronounced as the English *oo*.

5. **Bulimulus durangoanus,** sp. n. (Tab. XV. figg. 11, 11 *a*.)

Testa perforata, subelongata, irregulariter striatula, nitidula, alba, punctis et strigulis diaphano-griseis aspersa; anfr. 6, primus et secundus subglobosi, verticaliter costulati, pallide fuscescentes, sequentes convexiusculi, sutura sat impressa, ultimus infra modice attenuatus; apertura dimidiam longitudinem testæ non æquans, paullum obliqua, ovata, superne acuminata, peristomate simplice, margine externo recto, tenui, arcuato, basali arcuato, columellari superne dilatato, reflexiusculo.

Long. 15, diam. 6; long. aperturæ $6\frac{1}{2}$, latit. apert. 4 millim.

Hab. N. Mexico: Villa Lerdo, in the State of Durango (*Höge*).

I have seen only one specimen of this species. The greyish semitransparent points or short streaks follow the lines of growth, but in the third whorl from above there are also some oblique streaks in the direction from above and behind to below and in front.

B. durangoanus bears some resemblance to *B. gruneri*, Pfr., but is quite distinct from it in the different proportions of the whorls: if viewed from the side opposite to the aperture, the last whorl occupies half the length of the whole shell in *B. durangoanus*, somewhat less in *B. gruneri*; and the penultimate whorl, seen from the same side, equals nearly the length of all those which precede it in *B. durangoanus*, but much less in *B. gruneri*. The columellar margin of the aperture is somewhat inflated and twisted in *B. gruneri*, leaving a distinct depression between itself and the wall of the last whorl, whereas in *B. durangoanus* it is flatly dilated and joins the said wall quite plainly. Moreover, *B. gruneri* is uniformly white, without the greyish streaks and spots of *B. durangoanus*, but has, on the other side, the suture distinguished by its more opaque white colour.

It approaches also somewhat the Californian *B. artemisiæ*, Gould, but is not so much elongated. So far as the general form of the shell is concerned, these two species may be placed in the subgenus *Peronæus*, Albers, which contains chiefly species living in arid regions.

6. **Bulimulus corneus.** (Tab. XV. fig. 9.)

Bulinus corneus, Sowerby, P. Z. S. 1833, p. 37 [1].

Bulimus corneus, Pfr. Monogr. Helic. Vivent. ii. p. 219 [2]; in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, *Bulimus*, p. 242, t. 63. figg. 29, 30 [3]; Reeve, Conch. Icon. v., *Bulimus*, t. 21. fig. 134 [4]; Angas, P. Z. S. 1879, p. 479 [5] [not *B. corneus*, Lea (1837), see below, p. 248; nor of Michaud (1858), Deshayes (1833) (= *græcus*, Beck), or Menke (1830) (= *bæticatus*, Fér.), the two latter being now referred to *Buliminus*].

Bulimus (*Buliminus*) *corneus*, Beck, Index Moll. p. 71 (1838) [6].

Bulimus (*Leptomerus*) *corneus*, Albers, Die Helic. ed. 1, p. 166 [7]; Pfr. in Malak. Blätt. ii. p. 60 (1855) [8].

Orthalicus (*Leptomerus*) *corneus*, H. & A. Adams, Gen. Moll. ii. p. 156 [9].

Bulimulus (*Omphalostyla*) *corneus*, H. & A. Adams, loc. cit. p. 161 [10].

Bulimulus (*Leptomerus*) *corneus*, v. Mart. in Albers's Die Helic. ed. 2, p. 222 [11]; Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 548 [12].

Bulimulus corneus, Bland & Binney, Proc. Acad. Phil. 1873, p. 248 [13].

Bulimus berendti (Pfr.), Tate, Am. Journ. Conch. v. p. 156 (1870) [14]; Binney, Am. Journ. Conch. vii. p. 182 (jaw and radula) (1872) [15].

Hab. W. Guatemala: Retalhuleu, in the lowlands of the Pacific slope, at an elevation of not higher than 2000 feet above the sea (*Stoll*).

S.W. Guatemala: Escuintla, on the Pacific slope (*Morelet* [12]).

E. Guatemala: Zacapa, on *Cereus* sp. (*Stoll*).

N.W. Nicaragua: Realejo, under decayed grass (*Cuming* [14]).

S.E. Nicaragua: San Juan Castillo and Toro Rapids (*Gabb* [14]).

Nicaragua, without nearer indication of locality (probably Pacific coast) (*M'Niel* [15]).

N.W. Costa Rica: Guanacasta (*Pittier*).

N.E. Costa Rica: Puerto Viejo, on the Rio Sarapiqui (*Biolley*).

Central Costa Rica: Las Palmares, in the Province of Alajuela (*Orosco*); San José (*Biolley*).

E. Costa Rica: Tilorio and Zhorquin Rivers (*Gabb* [5]).

Var. *nubeculatus*: "saturatius nubeculatus."

Bulimus nubeculatus, Pfr. P. Z. S. 1851, p. 257 [16]; Monogr. Helic. Vivent. iii. p. 438 [17]; in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, *Bulimus*, p. 92, t. 31. figg. 15, 16 [18].

Bulimus (*Leptomerus*) *nubeculatus*, Pfr. in Malak. Blätt. ii. p. 160 (1855) [19].

Hab. Central America (*Morelet, in coll. Cuming* [16–18]).

Var. *minor*: concolor, long. 12, diam. 8, apert. long. 7 millim.

Bulimulus (*Leptomerus*) *nubeculatus*, Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 556, t. 24. figg. 7, 7 *a* [20].

Hab. E. Mexico: San Andres Tuxtla, near Vera Cruz (*Sallé* [20]).

Dr. O. Stoll found specimens of this species on loamy declivities, between blades of grass, before sunrise; later in the day it conceals itself beneath decaying leaves. For the variety *nubeculatus*, Pfeiffer [16–18] cites "Central America," upon the authority of Morelet, from a specimen in Cuming's collection. Fischer and Crosse [20] do not appear to have seen corresponding specimens from Morelet; but they have given the name *nubeculatus* to a smaller, unicolorous shell, collected at San Andres Tuxtla by Sallé.

The living animal is described by Dr. O. Stoll as follows:—"Body rather narrow, $2\frac{1}{2}$ centim. long; the back in the middle part longitudinally wrinkled, before and at the sides longitudinally and transversely wrinkled; pale greyish-brown, with two blackish lines, one behind each of the upper feelers. These latter 6 millim. long, blackish, on the inner side pale brown. Lower feelers 1 millim. long, conical, blackish, but paler than the upper ones. Hinder part of the foot flat, pointed, without median crest."

7. Bulimulus unicolor.

Bulinus unicolor, Sowerby, P. Z. S. 1833, p. 73 [1]; Conch. Illustr., *Bulinus*, fig. 13 [2].

Bulimus unicolor, Deshayes, in Lamarck's Hist. Nat. des Anim. sans Vert. ed. 2, viii. p. 280 [3]; Pfr. Monogr. Helic. Vivent. ii. p. 219 [4]; in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, *Bulimus*, p. 234, t. 62. figg. 41, 42 [5]; Reeve, Conch. Icon. v., *Bulimus*, t. 21. fig. 133 [6].

Bulimus (*Buliminus*) *unicolor*, Beck, Index Moll. p. 71 [7].
Bulimus (*Leptomerus*) *unicolor*, Albers, Die Helic., ed. 1, p. 166 [8]; Pfr. in Malak. Blätt. ii. p. 160 (1855) [9].
Orthalicus (*Leptomerus*) *unicolor*, H. & A. Adams, Gen. Moll. ii. p. 156 [10].
Bulimulus (*Leptomerus*) *unicolor*, v. Mart. in Albers's Die Helic. ed. 2, p. 222 [11].

Hab. S. Panama: Perico Island, in the Bay of Panama, found on dead leaves (*coll. Cuming* [1 4 5]).

Var. *petenensis*.

Bulimus petenensis, Morelet, Test. Noviss. ii. p. 10 (1851) [12]; Pfr. Monogr. Helic. Vivent. iii. p. 428 [13].
Bulimulus (*Leptomerus*) *petenensis*, Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 553, t. 20. fig. 13 [14].

Hab. N. Guatemala: Peten, on open savanas, on blades of grass (*Morelet* [12–14]).

Var. *istapensis*.

Bulimulus (*Leptomerus*) *istapensis*, Fisch. & Crosse, loc. cit. p. 549, t. 20. fig. 18 [15].
Bulimus istapensis, Pfr. Monogr. Helic. Vivent. viii. p. 153 [16].

Hab. S. Guatemala: Istapa, Pacific coast region, in the forest (*Morelet* [15]).

Bulimus corneus, Lea (not Sowerby), Observ. Unionidæ, ii. p. 66, t. 33. fig. 111 (1837), may belong to this species; but, as the figure does not quite agree, I cannot be certain about it. If this should prove to be the case, the area of *B. unicolor* extends to the northern part of South America, Lea's shell having been found at "Buenavista, in Colombia," by Mr. T. R. Peale, to whom we are indebted for some other Colombian shells. The locality Guayaquil, however, given by Pfeiffer [4] on d'Orbigny's authority, I omit intentionally, as it is not mentioned in d'Orbigny's larger work containing the results of his travels in South America, but only in the preliminary "synopsis."

8. **Bulimulus sarcodes.**

Bulimus sarcodes, Pfr. P. Z. S. 1846, p. 30 [1]; Monogr. Helic. Vivent. ii. p. 220 [2]; Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, *Bulimus*, p. 233, t. 62. figg. 39, 40 [3]; Reeve, Conch. Icon. v., *Bulimus*, t. 61. fig. 414 [4].
Bulimus (*Leptomerus*) *sarcodes*, Albers, Die Helic. ed. 1, p. 166 [5]; Pfr. in Malak. Blätt. ii. p. 160 (1855) [6].
Bulimulus (*Leptomerus*) *sarcodes*, v. Mart. in Albers's Die Helic. ed. 2, p. 222 [7].

Hab. Honduras (*Dyson* [1–4]).

9. **Bulimulus coriaceus.**

Bulimus coriaceus, Pfr. P. Z. S. 1856, p. 318 [1]; Monogr. Helic. Vivent. iv. p. 504 [2]; vi. p. 152 [3].
Bulimulus (*Leptomerus*) *coriaceus*, v. Mart. in Albers's Die Helic. ed. 2, p. 222 [4]; Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 552, t. 21. figg. 7, 7 *a* [5].

Bulimulus berendti (part.), Strebel, Beitr. Mex. Land- und Süssw.-Conch. iv. t. 6. fig. 15 (upper figure), v. p. 55 [6].

Var. *berendti*: gracilior.

Bulimus behrendti, Pfr. in Malak. Blätt. viii. p. 168, t. 3. figg. 4, 5 (1861) [7].
Bulimus berendti, Pfr. Monogr. Helic. Vivent. vi. p. 149 [8].
Bulimulus berendti, Binney & Bland, Am. Journ. Conch. vii. p. 182 (jaw and radula) [9]; Strebel, Beitr. Mex. Land- und Süssw.-Conch. iv. t. 6. fig. 15 (lower figure), v. p. 55 [10].
Bulimulus (*Leptomerus*) *berendti*, Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 554, t. 21. figg. 8, 8 *a* [11].

Hab. E. Mexico: State of Vera Cruz (*Sallé* [1 2]); Jalapa, common (*Höge*); Orizaba (*Hegewisch* and *Berendt* [2 3 5 7 8 10 11]); Cordova (*Berendt* [8 11], *Sallé* [5], *Höge*); Vera Cruz, in the "callejones," on shrubs (*Strebel* [10]); Toxpan, near Cordova (*Sallé* [5], *Berendt* [10]); Atoyac (*Höge*).

S.E. Mexico: Tabasco [3]; Teapa and San Juan Bautista, in the same State (*H. H. Smith*).

S.W. Mexico: Cacoprieto, near Santa Efigenia, Tehuantepec (*Sumichrast* [10]).

After examining a large number of specimens, most of them collected by Höge, I have no doubt that Strebel is perfectly justified in uniting *B. coriaceus* and *B. berendti*. He does not even distinguish them as varieties, whereas Fischer and Crosse not only maintain them as distinct species, but also describe and figure very short and subglobose specimens from Toxpan and Orizaba as var. β of *coriaceus*. The chief difference is, whether the whorls merge a little more or less one into the other; of course in the more involute specimens each whorl must become somewhat more convex in order to gain outwards the room which is lost by the deeper immersion of the preceding whorl, and as a result the suture will be somewhat more marked and the umbilicus a little more open. Therefore we find in Pfeiffer's Monograph *B. coriaceus* in the "§ perforati vel umbilicati," and *B. berendti* in the "§ subperforati," and somewhat widely separated from each other; this is probably the chief reason why Pfeiffer did not unite them himself. Most of the specimens collected by Höge are intermediate between the two extremes. In the geographical distribution there also seems to be no difference, the same localities having been quoted for the two so-called species.

I have not enumerated other more southern localities mentioned by Fischer and Crosse [11] for *B. berendti*:—(1) Boom, in Belize (British Honduras), on the authority of Dr. Berendt, as neither Strebel nor Pfeiffer mentions this locality; and (2) Nicaragua on the authority of Tate and Binney, because the specimens from that country have been subsequently recognized as belonging to *B. corneus*.

10. **Bulimulus inermis.**

Bulimus inermis, Morelet, Test. Noviss. ii. p. 10 (1851) [1]; Pfr. Monogr. Helic. Vivent. iii. p. 441 [2].

Bulimulus (*Leptomerus*) *inermis*, Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 550, t. 20. figg. 16, 17 [3].

Hab. CAMPECHE: environs of Palizada (*Morelet* [1–3]).

Var. *major*: long. 13½, diam. 6, apert. 5 millim.

Hab. N. GUATEMALA: valley of the Rio Chisoy, at Rancho Chisoy (*Stoll*).

11. Bulimulus translucens.

Bulinus translucens, Broderip, P. Z. S. 1842, p. 31 [1]; Sowerby, Conch. Illustr., *Bulinus*, fig. 11 [2].

Bulimus translucens, Deshayes, in Lamarck's Hist. Nat. des Anim. sans Vert. ed. 2, viii. p. 265 [3]; Pfr. Monogr. Helic. Vivent. ii. p. 196 [4]; in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, *Bulimus*, p. 241, t. 63. figg. 27, 28 [5]; Reeve, Conch. Icon. v., *Bulimus*, t. 13. fig. 71 [6].

Bulimus (*Bulimulus*) *translucens*, Beck, Index Moll. p. 67 [7].

Bulimus (*Leptomerus*) *translucens*, Albers, Die Helic. ed. 1, p. 166 [8]; Pfr. in Malak. Blätt. ii. p. 160 (1855) [9].

Bulimulus (*Leptomerus*) *translucens*, v. Mart. in Albers's Die Helic. ed. 2, p. 222 [10].

Hab. S. PANAMA: Isla del Rey (San Miguel), in the Pearl Islands, and Taboga Island, both in the Bay of Panama *, on trees (*Cuming* [3–6]).

12. Bulimulus dysoni.

Bulimus dysoni, Pfr. P. Z. S. 1846, p. 39 [1]; Monogr. Helic. Vivent. ii. p. 183 [2]; Reeve, Conch. Icon. v., *Bulimus*, t. 62. fig. 435 [3].

Bulimus (*Leptomerus*) *dysoni*, Albers, Die Helic. ed. 1, p. 166 [4]; Pfr. in Malak. Blätt. ii. p. 160 (1855) [5].

Orthalicus (*Leptomerus*) *dysoni*, H. & A. Adams, Gen. Moll. ii. p. 156 [6].

Bulimulus (*Leptomerus*) *dysoni*, Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 551 [7].

Bulimulus dysoni, Pilsbry, Proc. Acad. Phil. 1891, p. 315 [8].

Hab. YUCATAN: Tabi (*Pilsbry* [8]).

HONDURAS (*Dyson* [1–3]).

CENTRAL NICARAGUA: Acoyapa (*Belt*, Dec. 1879).

Var. *ignavus*: minor, pallidior.

Bulimus ignavus, Reeve, Conch. Icon. v., *Bulimus*, t. 77. fig. 562 [9].

Bulimus dysoni, var. *minor*, Pfr. Monogr. Helic. Vivent. iii. p. 438 [10].

Bulimus dysoni, Tristram, P. Z. S. 1861, p. 230 [11].

Bulimulus (*Leptomerus*) *dysoni*, var. *β*, Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 551, t. 24. figg. 8 *a*, 8 *b* [12].

Hab. CAMPECHE (*Sallé* [12]); Palizada (*Morelet* [12]).

GUATEMALA, without nearer indication of locality (? Coban) (*Salvin* [11]).

The typical form is distinguished by its rather intense reddish-brown colour and shining appearance.

* Quoted as King I. and Saboga I.

The shell named by Strebel as ? *B. dysoni*, Pfr., from Tabasco (Beitr. Mex. Land- und Süssw.-Conch. iv. t. 6. figg. 16 *a*, *b*, v. p. 56), I cannot acknowledge as belonging to the same species.

13. **Bulimulus (?) umbraticus.**

Bulimus umbraticus, Reeve, Conch. Icon. v., *Bulimus*, t. 77. fig. 559 (1849) [1]; Pfr. Monogr. Helic. Vivent. iii. p. 414 [2].

Bulimus (*Leptomerus*) *umbraticus*, Pfr. in Malak. Blätt. ii. p. 100 (1855) [3].

Hab. Central America [1 2].

On account of the elevated striæ, this species may perhaps belong to *Stenogyra*.

The following species cannot be admitted as belonging to the Mexican and Central-American fauna, although they have been so treated by some authors :—

Bulimus parvus, Lea, type from Cartagena, in Colombia, is mentioned by R. Tate, in Am. Journ. of Conchol. v. p. 156, as found in the Savana region of Nicaragua. As this species is very imperfectly known, and perhaps only the young state of some other, I dare not introduce it into the Central-American fauna.

Bulimus cordovanus, Pfr., from Cordova, in the Argentine Republic, has been by error attributed to Cordova (near Vera Cruz) in Mexico by Pfeiffer himself, Monogr. Helic. Vivent. iv. p. 435, and vi. p. 75, but duly corrected by him, op. cit. viii. p. 105.

Odontostomus punctatissimus, Lesson, a well-known Brazilian species = *Clausilia exesa*, Potiez & Michaud, Galerie d. Moll. du Musée de Douai, i. p. 191 (1838), "Mme. Dupont dit l'avoir reçue du Mexique."

Otostomus fucatus, Reeve, is incorrectly stated, in Albers's Die Helic. ed. 2, p. 212, to be from the same locality as *O. varicosus*, Pfr.,—that is to say, from Mexico; it is from Colombia and Ecuador.

Bulimus gelidus, Reeve, Conch. Icon. v., *Bulimus*, t. 76. fig. 553, from ? Central America, is, according to Edg. Smith, who has examined the type, probably identical with *B. montevidensis*, Pfr., from Monte Video.

Bulimus mexicanus, Lamarck, Hist. Nat. des Anim. sans Vert. vi. p. 123 (ed. Deshayes, viii. p. 232); Valenciennes, in Humboldt & Bonpland's Obs. Zool. ii. p. 247, t. 56. fig. 1; Delessert, Recueil de Coq. t. 27. fig. 9; *Helix vittata*, Férussac, Tabl. Syst. no. 397; is founded on a shell obtained by Humboldt during his voyage. This species is also figured by Reeve, Conch. Icon. v., *Bulimus*, t. 58. fig. 391, under the name *B. humboldti*; it does not, however, live in Mexico, but in Colombia, where Humboldt also travelled, as I have already stated in Malak. Blätt. xii.

p. 24 (1865). But several authors have tried to recognize it in truly Mexican species (see the synonymy of *Otostomus emeus* and *O. tryoni*).

I may be allowed to add a few remarks concerning *Bulimus rimatus*, Pfr., and *B. spirifer*, Gabb, which have sometimes been confounded with *B. membranaceus* (Phil.), see *anteà*, p. 223, also Fischer and Crosse, Miss. Scient. Mex., Mollusca, i. p. 560, suggesting that all three may possibly belong to the same species. By comparing Pfeiffer's original description of *B. rimatus*, P. Z. S. 1846, p. 112, and Monogr. Helic. Vivent. ii. p. 104, from a specimen in Cuming's collection, and the figure given by Reeve, Conch. Icon. v., *Bulimus*, t. 54. fig. 359, with specimens of *B. spirifer* from the Peninsula of Lower California, I have no doubt that the two are identical and that Pfeiffer's name must be adopted. The locality "Afghanistan" given to *B. rimatus* in Albers's Die Helic. ed. 2, p. 233, is evidently a mistake, the printer having misunderstood the sign of interrogation (?) in the manuscript and changed it into the sign of repetition („); in Albers's collection no locality is given, and the shell is identical with that of *B. spirifer*. What Jay's *B. rimatus*, Pfr., from Japan [Perry's Narrative, ii. p. 296 (1856)], may have been, I do not know. But Philippi's *B. membranaceus* is proved by the original description and figure (see *anteà*, p. 223) to differ from *B. spirifer*; distinct spiral striæ are mentioned, but not the characteristic columellar fold: in several collections, however, these names are misapplied.

SIMPULOPSIS.

Simpulopsis, Beck, Ind. Moll. p. 100 (1838).

Shell very thin, oblong, with comparatively few whorls, the last ventricose; the aperture large, with thin simple peristome. Jaw arcuate, with six ribs in the middle and three stronger ones on each side. Radula with oblique rows; median tooth shovel-shaped, and in some species with a minute lateral point on each side; lateral teeth also shovel-shaped, with a short external lateral point; marginals unequally tricuspidate. [Heynemann, Malak. Blätt. xv. p. 111, t. 5. fig. 10 (1868); Binney, Bull. Mus. Comp. Zool. v. no. 16, p. 338, t. 1. fig. *g*.]

The shell has the appearance of a *Vitrina* or *Succinea*, but the radula is more like that of *Bulimulus*.

Geographical distribution: Brazil, West Indian Islands, Mexico, and Guatemala. Whether the few species quoted from the islands of the Indian and Pacific Oceans really belong to this genus is rather questionable. See also *Xanthonyx*, infrà.

COMPARATIVE TABLE OF THE SPECIES OF *SIMPULOPSIS*.

Nomen.	Figura.	Sculptura.	Coloratio.	Long.	Diam.	Aperturæ.	
						Alt. obliq.	Diam.
				mm.	mm.	mm.	mm.
simula, *Morel.* ...	mucronato-globosa.	oblique plicatula.	fulvo-virens.	11	9	7	6
ænea, *Pfr.*.....	depresse conico-globosa.	confertissime striata.	pellucida, æneo-micans.	5½	9	7	5
cumingi, *Pfr.* ...	subglobosa.	leviter et irregulariter plicatula.	viventi-cornea.	12	20½	14	15

1. Simpulopsis simula.

Bulimus simulus, Morelet, Test. Noviss. ii. p. 11 (1851) [1]; Pfr. Monogr. Helic. Vivent. iii. p. 383 [2].
Simpulopsis simula, Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 578, t. 24. figg. 13, 13 *a* [3].

Hab. N. GUATEMALA: Peten, in woods, on the leaves of trees (*Morelet* [1–3]).

2. Simpulopsis ænea.

Simpulopsis ænea, Pfr. P. Z. S. 1861, p. 27 [1]; Malak. Blätt. viii. p. 84 (1861) [2]; Monogr. Helic. Vivent. v. p. 22 [3]; Reeve, Conch. Icon. xiii., *Simpulopsis*, t. 1. fig. 7 [4]; Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 580, t. 24. figg. 12, 12 *a*, *b* [5].

Hab. S. CENTRAL MEXICO: Parada, in the State of Oaxaca (*Sallé* [1–5]).

3. Simpulopsis cumingi.

Simpulopsis cumingi, Pfr. P. Z. S. 1861, p. 27, t. 3. fig. 2 [1]; Malak. Blätt. viii. p. 84 (1861) [2]; Monogr. Helic. Vivent. v. p. 22 [3]; Reeve, Conch. Icon. xiii., *Simpulopsis*, t. 1. fig. 5 [4].

Hab. MEXICO, without nearer indication of locality [1–4].

Fam. CYLINDRELLIDÆ.

Shell turrite, with many gradually increasing whorls; aperture more or less circular, with continuous edges all round, often drawn out freely beyond the junction of the last whorl with the penultimate whorl. Jaw and radula agreeing generally with that of the Aulacognatha (*anteà*, p. 126) and Pupidæ (*infrà*), in the genera which are characteristic and confined to Central America, as *Eucalodium*, *Cœlocentrum*, and *Holospira*, but peculiarly modified in *Cylindrella* and *Macroceramus*, which both belong essentially to the West Indian Islands and are represented on the mainland of America by very few species. The differences and analogies between these two groups are given at length by H. Strebel [Beitr. Mex. Land- und Süssw.-Conch. iv. p. 52 (1880), &c.], who has shown that the Eucalodiinæ and Cylindrellidæ are not so sharply defined as P. Fischer and Crosse supposed. In *Eucalodium*, *Cœlocentrum*, and most species of

Cylindrella, but not in *Holospira* and *Macroceramus*, a number of the upper whorls are progressively lost during life, so that the individual has never at the same time the full number of whorls. The loss of the whorls during life is proved by the closing of the hole by a shelly, often slightly convex, wall (see Tab. XVI. fig. 28 *a*), whereas in worn dead shells, which by external injury have lost a part of the whorls, the hole of the fracture remains open.

EUCALODIUM.

Urocoptis, sect. *a*. Conico-turritæ, Albers, Die Helic. ed. 2, p. 36 (1860).
Eucalodium, Crosse & Fischer, Journ. de Conch. xvi. pp. 88 &c. (1868); Miss. Scient. Mex., Mollusca, i. pp. 353–362; Strebel, Beitr. Mex. Land- und Süssw.-Conch. iv. p. 62.

Shell turrite, with many whorls, the uppermost always lost in the adult shell and the hole closed by a newly formed wall; last whorl somewhat narrowed and a little produced beyond the suture with the penultimate whorl; aperture roundish, with the edge free all round and a little expanded. Columellar axis solid (instead of hollow, as in *Cœlocentrum*), a little plaited. Surface covered by a distinct periostracum of pink, brownish, or yellowish colour and costulate in a somewhat oblique direction, these costæ and markings, when present, being parallel with the edges of the aperture and more or less numerous, but never very prominent. Size comparatively large, between 84 and 32 millim. in length and 21 and 10 millim. in diameter. Number of remaining whorls 7–14, exceptionally more or less. Jaw arcuated, with feeble ribs. Teeth of the radula moderately pointed; median tooth a little smaller than the next ones, with a basal point on each side; lateral teeth with a basal point only on the outer side. Reproductive organs simple. For further anatomical characters, see the works of Fischer and Strebel.

Geographically limited to the southern half of Mexico and the northern half of Guatemala: on the Atlantic slope, known from the neighbourhood of Misantla to the valley of the Polochic river, south of Coban; on the Pacific slope, only from Colima to Tehuantepec; rare in the central regions. The most characteristic and largest species on the Atlantic slope, those of the Pacific slope nearly all belonging to the subdivision *Anisospira*. They live chiefly on the ground, in moist woods, or under leaves, such as those of *Agave*.

The species are difficult to distinguish, as the outline of the shell sometimes shows individual variation. The absolute length of adult specimens is not a reliable character, as it varies much according to the number of preserved whorls; the diameter of the shell (measured on the whorl before the last) and the size of the aperture are, however, safer guides. The sculpture affords some specific differences, but the transverse or spiral striæ, which are characteristic of several species, sometimes become very feeble or scarcely visible in certain individuals; in worn specimens it may be much altered. In some cases the amount of convexity of the single whorls, and the relation of the

visible part of each whorl to its diameter, is important; but these differences, although discernible to the experienced eye of a conchologist, cannot well be denoted by a single word or number in a comparative Table. As regards the number and definition of the species, I have followed mostly Pfeiffer, Crosse and Fischer, and last, but not least, Strebel; but I am not sure that all will hold good when better series of each are available for comparison.

The species may be arranged in the following groups:—

1. Shell large, exceeding 70 millim. in height and 15 in breadth, cylindrically turrite, with moderately produced aperture; colour violet or brownish.—*ghiesbreghti, blandianum, walpoleanum, insigne, decollatum.*
2. Shell somewhat smaller and often of a paler colour; in other respects similar to the preceding.—*compactum, mexicanum, grande, splendidum, decurtatum, densecostatum.*
3. ***Resupinata,*** n. Shell somewhat fusiform, narrowed below, last whorl descending considerably beyond the suture, and the plane of the aperture thus very oblique; colour yellowish or brown.—*speciosum, edwardsianum, deshayesianum. E. cereum* forms the transition to the following.
4. Last whorl less or scarcely produced beyond the suture.
   a. Colour of the shell dull brown; sculpture feeble.—*moussonianum, neglectum, truncatum.*
   b. Colour of the shell whitish; ridges nearly vertical.—*recticosta.*
5. ***Anisospira,*** Strebel. Shell strongly ventricose in the middle, rapidly narrowed above and also remarkably narrowed towards the aperture; colour reddish or white.—*strebeli, liebmanni, hyalinum.*

Strebel treats this last subdivision as a distinct genus, and places it nearer *Cylindrella*, sensu stricto, than to *Eucalodium*; but till the form of the jaw and radula of the species belonging to it is known, there can be no positive decision about it. In this matter I agree with Fischer and Crosse, who point out that the form of the aperture is more like that of typical *Eucalodium* than of *Cylindrella cylindrus*, Chemn., which, among the insular forms, approaches nearest *E. liebmanni* in general outline and colour. Moreover, *E. strebeli* is a connecting-link with the true *Eucalodia.*

In this genus, and also in *Cœlocentrum*, *Holospira*, and *Cylindrella*, the diameter of the shell is measured from the penultimate whorl, *i. e.* above the upper end of the aperture, as the production of the aperture gives to the last whorl a disproportionate extension in diameter.

1. Eucalodium ghiesbreghti.

Cylindrella ghiesbreghti, Pfr. P. Z. S. 1856, p. 380, t. 36. fig. 1[1]; Malak. Blätt. iii. p. 216 (1856)[2]; Monogr. Helic. Vivent. iv. p. 694[3]; and in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, *Cylindrella,* p. 33, t. 8. figg. 18, 19[4]; Tristram, P. Z. S. 1861, p. 231[5]; Sowerby in Reeve's Conch. Icon. xx., *Cylindrella,* t. 1. fig. 7[6].

Eucalodium ghiesbreghti, Crosse & Fisch. Journ. de Conch. xvi. p. 88 (1868)[7], and xviii. p. 13, t. 5. figg. 1–4 (jaw and radula) (1870)[8]; Miss. Scient. Mex., Mollusca, i. p. 368, t. 14. figg. 4, 4 *a*, and t. 16. figg. 14–21 (anatomy)[9]; Strebel, Beitr. Mex. Land- und Süssw.-Conch. iv. p. 63, t. 5. fig. 20, t. 14. figg. 11 A, B[10].

Comparative Table of the Species of *Eucalodium*.

Nomen.	Sculptura.	Forma.	Color.	Apertura.	Plica columellaris.	Long.	Diam.	Aperturæ.		Patria.
								Long.	Diam.	
ghiesbreghti, *Pfr.*	irregulariter et flexuose rugulosa.	clavato-turrita.	fusco-violaceus, ad apert. albus.	oblique ovata, supra et infra subangulata.	angulata.	mm. 84·7 82 73	mm. 21 21 21	mm. 18 19 18	mm. 14½ 16 16	S.E. Mexico, N. Guatemala.
blandianum, *Cr. & Fisch.*	distincte costulata et malleolata.	cylindrico-turrita.	flavo-fuscus, costulis pallidioribus.	piriformis, supra subangulata, infra rotundata.	recte ascendens non angulata.	80 75	21 17	18½ 15	15 14	E. Mexico.
walpoleanum, *Cr. & Fisch.*	confertim costulata, transversim striata.	,,	flavo-fuscus vel fuscus.	subcircularis, supra obtusangula.	,,	84 74	17 19	15 15	13 13½	S.E. Mexico, N. Guatemala.
insigne, *Cr. & Fisch.*.....	regulariter subobligue costulata.	,,	livide cinereo-carneus.	oblique ovata.	,,	74	18	15½	12	S. Mexico.
decollatum, *Nyst*	suboblique costulata.	clavato-turrita.	pallide cinereo-fuscescens.	subquadrata.	leviter angulata.	75 60	20 16½	15½ 13	15 13	S.E. Mexico, N. Guatemala.
compactum, *Pilsbr.*	confertim arcuato-striata.	latiuscule cylindrico-turrita.	pallide stramineus.	ovato-circularis.	non angulata.	33	19½	14	13	S.E. Mexico.
mexicanum, *Pfr.*	leviter striatula et irregulariter decussatula.	cylindrico-turrita.	rutilo-fuscus, sutura albidula.	subcircularis, supra angulata.	obtuse angulata.	55 52	15 14	13 11	10¼ 9	S.E. Mexico.
——, var. major, *Fisch. & Cr.*	,,	,,	violaceo-fuscus.	,,	,,	67 64	16 15	13½ 13	11 12	N. Guatemala.
——, var. minor, *Fisch. & Cr.*	,,	,,	,,	,,	,,	33	10–11	9½	7½	S. Centr. Mexico.
grande, *Pfr.*	confertim costulata, interstitiis spiratim striatulis.	,,	fusco-rubellus vel carneo-violaceus, sutura albidula.	ovata, supra acutangula.	non angulata, recte ascendens.	52 60	16 17½	12½ 14½	10 11	S. Centr. Mexico.
splendidum, *Pfr.*	oblique costulata.	,,	violascenti-carneus.	late rotundata.	leviter flexuosa.	49–50 44	15 15	10½ 11	10½ 11·3	S. Centr. Mexico.
decurtatum, *H. Ad.*	oblique costulata, in anfr. penult. et ult. sublævigatis.	,,	pallide violaceo-carneus, sutura alba.	subangulato-circularis.	subrecte ascendens.	28–32	10–10½	6–8	7½	S. Centr. Mexico.

densecostatum, *Streb.* ...	confertim costulato-striata.	,,	pallidus ?	ovata.	oblique ascendens, supra magis distincta.	40	12	8½	7	E. Mexico.
speciosum, *Dunk.*	confertim costulato-striata et spiratim striolata.	subclavato-turrita.	stramineus, sericeus.	valde producta, resupinata ovata.	,,	46	13	11	8½	E. Mexico.
——, var. boucardi, *Pfr.*	,,	,,	stramineus.	,,	,,	55–56	13–14	11–12	9-10	E. Mexico.
——, var. strebeli, *v. Mart.*	,,	,,	fuscescens.	,,	,,	40½–45	11–12	9–10	7–8	E. Mexico.
——, var. minimum, *Fisch. & Cr.*	,,	,,	fusco-stramineus, fuscus.	,,	,,	39 41	10 8½	8 8½	7 6½	E. Mexico.
——, var. fischeri, *v. Mart.*	confertim costulato-striata.	cylindrico-turrita.	pallide fulvus.	,,	,,	36	9½	8	7	E. Mexico.
edwardsianum, *Cr. & Fisch.*	subdistanter costulato-striata.	subinflato-turrita.	fulvo-stramineus.	,,	,,	48 46	13 10	9½ 9	8 7	E. Mexico.
deshayesianum, *Cr. & Fisch.*	leviter striatula.	,,	pallide carneus.	,,	subnulla.	32	9½	7	6½	E. Mexico.
cereum, *Streb.*	confertim costulato-striata et spiratim striatula.	late turrita.	stramineus, strigis fuscescentibus.	minus producta, sat resupinata, ovata.	arcuatim ascendens.	36	10½	8½	7½	E. Mexico.
moussonianum, *Cr. & Fisch.*	costulata et subinde malleolata.	subcylindrico-turrita.	olivaceo-fulvus.	minus producta, subcircularis.	subnulla.	44 46	14 14	10½ 10½	10 9	? E. Mexico.
neglectum, *Cr. & Fisch.*...	obtuse costulata.	fusiformi-turrita.	,,	minus producta, anguloso - ovata, parva.	,,	38 42	11 12	8½ 9	8 8	S. Centr. Mexico.
truncatum, *Pfr.*	subverticaliter confertim striatula.	cylindrico-turrita.	nitide olivaceo-fuscus, sutura alba.	vix producta, subcircularis.	oblique ascendens, debilis.	35	9½	7½	7	Centr. & S.W. Mexico.
recticosta, *Pfr.*	verticaliter confertim costulata.	,,	albidus.	,,	subnulla.	36 39	12 11½	9½ 9	9½ 9	W., S.E., & S. Centr. Mexico.
strebeli, *Pfeff.*	oblique leviter costulata.	ovato-oblonga, supra subito attenuata.	violascenti-rubicundus.	minus producta, oblique piriformis vel rotundato-trigona.	,,	50 43 38 35	15 14 13 12	11½ 11 10 9	10 10 9 8½	S.W. Mexico.
liebmanni, *Pfr.*	oblique striatula.	ventricosa, subovata, supra subito attenuata.	pallide fulvidus, basi unifasciata.	minus producta, oblique piriformis.	,,	32 40	13–14 17	9 9	9 9½	S.W. Mexico.
hyalinum, *Pfr.*	subarcuatim tenuiter costulato-striata.	ovato-oblonga, supra subito attenuata.	lacteus, diaphanus.	minus producta, subcircularis.	,,	37 39	12 11½	9 9	8½ 9	S.E. & S. Centr. Mexico.

Hab. S.E. Mexico: Chiapas (*Ghiesbreght* [1–4 6 10]).
N. Guatemala: Vera Paz (*Bocourt* [7 8 9]), Coban (*Salvin* [5]).

Distinct by its dark violet colour, feeble sculpture, and comparatively large increase in diameter of the lower whorls; a feeble keel at the base of the last whorl; the number of remaining whorls in full-grown specimens varying from 9–13.

In the late Prof. Dunker's collection, now in the Museum of Berlin, there is a very abnormal specimen, having the last whorl not detached at the end from the suture, the aperture irregularly circular, measuring 16 millim. in height and as much in breadth (diameter), whereas, ordinarily, the breadth of the aperture is distinctly less than its height (14 to 17–18½ millim.), and the columellar fold nearer the outside than usual. The living shell had, no doubt, been fractured when full-grown, and the new aperture built somewhat behind the first one. A similar abnormal shell of another species has been figured by Sowerby (Reeve's Conch. Icon. xx., *Cylindrella*, t. 1. fig. 6). The figure 7 in the 'Conchologica Iconica' represents a specimen with an unusually large number of preserved whorls, 97 millim. long.

The locality "Dueñas," quoted by Fischer and Crosse [9] from Tristram [5], is certainly incorrect, the majority of the shells mentioned in that paper having been found in the immediate neighbourhood of Coban, according to direct information from Mr. O. Salvin himself.

2. **Eucalodium blandianum.**

Eucalodium blandianum, Crosse & Fisch. Journ. de Conch. xvi. p. 276 (1868) [1], and xviii. p. 22 (1870) [2]; Miss. Scient. Mex., Mollusca, i. p. 374, t. 14. figg. 5, 5 *a*, and t. 16. figg. 11–13 (radula) [3]; Strebel, Beitr. Mex. Land- und Süssw.-Conch. iv. p. 65, t. 7. figg. 2 *a–k* and 5, t. 14. figg. 10 A, B, t. 11. figg. 4, 5 (radula), t. 11. fig. 12 (jaw), and t. 12. fig. 2 (anatomy) [4].

Cylindrella speciosa (Dkr.), Sowerby, in Reeve's Conch. Icon. xx., *Cylindrella*, t. 1. fig. 2 (nec Pfr.) [5].

Cylindrella blandiana, Pfr. Monogr. Helic. Vivent. viii. p. 136 [6].

Hab. E. Mexico: mountains near Orizaba [6] (*Sallé* [1–3], *Bland* [1–3], *Botteri* [4]); rocky country near San Juan, Miahuatlan, between Jalapa and Misantla, on the moist ground, between moss and herbs (*Doña Estefania* [4]); Coatepec (*Höge*).

Variable in size and form, some specimens being rather broad and full and others comparatively slender and narrow; for extreme dimensions, see above, p. 256. Characterized by the yellowish-brown rather glossy colour, the comparatively strong costæ, which are somewhat paler than the interstices, and the malleated (hammer-like) impressions scattered here and there between the costæ or in place of them. The interstices mostly twice as wide as the costæ. The transverse striæ in the interstices very feeble and irregular. Scattered darker brown streaks, marking periods of growth,

are found in this species, as well as in *E. walpoleanum*. Transverse dark brown spots in the interstices occur also here and there in both species.

The locality "Colombia" given by Sowerby is no doubt incorrect.

3. Eucalodium walpoleanum.

? *Cylindrella decollata* (Nyst), Pfr. in Philippi's Abbild. neuer Conch. ii. p. 47, *Cylindrella*, t. 2. fig. 1 [1]; Monogr. Helic. Vivent. i. p. 368 [2]; in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, *Cylindrella*, p. 33, t. 1. fig. 2 [3].

Eucalodium walpoleanum, Crosse & Fisch. Journ. de Conch. xx. p. 75 (1872) [4]; Miss. Scient. Mex., Mollusca, i. p. 377, t. 14. figg. 6, 6 *a* [5]; v. Mart. P. Z. S. 1875, p. 648 [6]; Strebel, Beitr. Mex. Land- und Süssw.-Conch. iv. p. 67, t. 7. figg. 1 *a*, *b*, and t. 14. fig. 12 [7].

Cylindrella walpolei, Sowerby in Reeve's Conch. Icon. xx., *Cylindrella*, t. 6. fig. 51 [8].

Cylindrella walpoleana, Pfr. Monogr. Helic. Vivent. viii. p. 427 [9].

Hab. S.E. Mexico: woods of Palenque, Chiapas (*Morelet* [5]); Chiapas (*Boucard* [5]).

N. Guatemala: mountains of Vera Paz (*Bocourt* [5]); Coban (*Salvin* [6], *Conradt*); woods between Tactic and Tamahu (*Sarg* [5]).

Very near *E. blandianum*, resembling it in size and colour, but somewhat more slender and often of a darker brownish tint; the chief difference, however, is in the sculpture, *E. walpoleanum* having more numerous and more feeble costæ, with the interstices often not twice their width, and distinctly transversely striate, the striæ continued more or less on the costæ themselves, these latter generally being of the same colour as the interstices. The last whorl is angulated at the base, but the angle disappears more or less near the aperture. Number of remaining whorls in the full-grown shell 9–12.

In the Berlin Museum there is a specimen of this species which has been fractured during life and restored, in which the aperture does not exceed the suture, the columellar margin is rather distinctly toothed, and the basal edge is unusually strong. Several other specimens show a raised spiral line somewhat beneath the suture, or midway between the upper and lower suture in some of the terminal whorls and even in the last, but not regularly and in different degrees of strength.

Fischer and Crosse mention [5] a small variety from Guatemala; and Strebel (Beitr. Mex. Land- und Süssw.-Conch. iv. p. 68, t. 7. fig. 3) a form "B," based upon specimens found at Miahuatlan, in Eastern Mexico, in company with *E. blandianum*, resembling the latter in colour and gloss and in the strength of the costæ, but having the transverse striated sculpture of *E. walpoleanum*.

4. Eucalodium insigne.

Eucalodium insigne, Crosse & Fisch. Journ. de Conch. xx. p. 301 (1872) [1]; Miss. Scient. Mex., Mollusca, i. p. 366, t. 14. figg. 7, 7 *a* [2].

Cylindrella insignis, Pfr. Monogr. Helic. Vivent. viii. p. 428 [3].

Hab. S. Mexico: without nearer indication of locality [1–3].

Resembles *E. ghiesbreghti* in the form of the aperture, but more slender, paler in colour, and with stronger costæ.

5. Eucalodium decollatum.

Pupa decollata, Nyst, Bull. Acad. Bruxelles, viii. no. 5, p. 345, cum fig. (1841) [1].
Eucalodium decollatum, Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 363, t. 14. figg. 3, 3 *a* [2].
Cylindrella decollata, Pfr. Monogr. Helic. Vivent. viii. p. 421 [3].

Hab. S.E. Mexico: Tabasco (*Ghiesbreght* [1]).
N. Guatemala: Vera Paz (*Morelet* [2]).

Distinct by its pale greyish colour and the broad irregularly quadrate aperture. Nyst's figure, as regards the general outline, is more like *E. ghiesbreghti* than that of Fischer and Crosse, which represents a smaller and more slender shell. Nyst states [1] that the costæ are more pronounced near the sutures, a peculiarity not mentioned in Fischer and Crosse's description, nor visible in their figures. The identification therefore remains somewhat doubtful.

6. Eucalodium compactum.

Eucalodium compactum, Pilsbry, Proc. Acad. Phil. 1892, p. 338, t. 14. fig. 4 [1].

Hab. S.E. Mexico: Tabasco (*Rovirosa* [1]).

Pale straw-coloured; the visible part of each whorl very low, not half its diameter; basal angle strong; aperture rather broad, obliquely oval.

7. Eucalodium mexicanum.

Cylindrella mexicana (Cuming), Pfr. P. Z. S. 1860, p. 139 [1]; Malak. Blätt. viii. p. 80 (1861) [2]; Monogr. Helic. Vivent. vi. p. 364 [3].
Eucalodium mexicanum, Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 369, t. 15. figg. 1, 1 *a–c* [4]; Strebel, Beitr. Mex. Land- und Süssw.-Conch. iv. p. 62, t. 6. fig. 7, and t. 11. figg. 3 (radula), 11 (jaw), and 16 (anatom.) [5].

Hab. S.E. Mexico: Tabasco (*Berendt* [5]); Chiapas (*Bland* [4]).

Var. *major.*

Eucalodium mexicanum, var. γ, Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 369 [6].

Hab. N. Guatemala: Alta Vera Paz (*Bocourt* [6]); woods between Tactic and Tamahu (*Sarg* [6]).

Var. *minor.*

Cylindrella mexicana, Pfr. Novit. Conch. iii. p. 435, t. 97. figg. 16, 17 (1869) [7].
Eucalodium mexicanum, var. β, Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 369 [8]; Strebel, Beitr. Land- und Süssw.-Conch. iv. p. 63, t. 5. fig. 11 [9].

Hab. S. Central Mexico: Juquila, in the State of Oaxaca [8].

Sowerby's figure of *Cylindrella mexicana* (Conch. Icon. fig. 61) does not represent a normal shell, and it may belong to a different species: see above, under *E. ghiesbreghti*.

8. **Eucalodium grande.**

Cylindrella grandis, Pfr. P. Z. S. 1860, p. 139, t. 50. fig. 3 [1]; Malak. Blätt. xii. p. 68 [2]; Monogr. Helic. Vivent. vi. p. 364 [3]; Novit. Conch. iii. p. 455, t. 100. figg. 8, 9 [4]; Sowerby, in Reeve's Conch. Icon. xx., *Cylindrella*, t. 1. fig. 4 [5].

Eucalodium grande, Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 371, t. 15. fig. 4 [6]; Strebel, Beitr. Mex. Land- und Süssw.-Conch. iv. p. 68, t. 5. fig. 19 [7].

Hab. S. Central Mexico: Juquila, in the State of Oaxaca (*Boucard* [1–4 6 7]).

9. **Eucalodium splendidum.**

Cylindrella splendida, Pfr. P. Z. S. 1860, p. 139, t. 50. fig. 1 [1]; Malak. Blätt. viii. p. 80 (1861) [2]; Monogr. Helic. Vivent. vi. p. 377 [3]; Novit. Conch. iii. p. 432, t. 97. figg. 1, 2 [4]; Sowerby, in Reeve's Conch. Icon. xx., *Cylindrella*, t. 1. fig. 3 [5].

Eucalodium splendidum, Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 372, t. 15. figg. 3, 3 *a* [6]; Strebel, Beitr. Mex. Land- und Süssw.-Conch. iv. p. 69, t. 5. fig. 17 [7].

Hab. S. Central Mexico: Zacatepec, in the State of Oaxaca (*Boucard* [1–4 6 7]).

10. **Eucalodium decurtatum.**

Cylindrella (*Urocoptis*) *decurtata*, H. Adams, P. Z. S. 1872, p. 13, t. 3. fig. 20 [1]; Pfr. Monogr. Helic. Vivent. viii. p. 439 [2].

Eucalodium decurtatum, Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 385, t. 15. figg. 5, 5 *a* [3].

Hab. S. Central Mexico: Putla, in the State of Oaxaca (*Boucard* [1–3]).

E. grande, *E. splendidum*, and *E. decurtatum* are very similar in form, sculpture, and colour, and differ chiefly in size.

11. **Eucalodium densecostatum.**

Eucalodium densecostatum, Strebel, Beitr. Mex. Land- und Süssw.-Conch. iv. p. 71, t. 6. fig. 10 (1889) [1].

Hab. E. Mexico: Orizaba (*Botteri* [1]).

The author knows only one specimen, and that bleached, but he states that it differs from all those described and figured in the work of Fischer and Crosse by the close costulation (170 costulæ on the last whorl), without visible interstices. He compares the species with *E. boucardi*, but the aperture is not so remarkably drawn out and bent backwards.

12. Eucalodium speciosum.

Cylindrella speciosa, Dunker, in Philippi's Abbild. neuer Conch. i. p. 86, *Cylindrella*, t. 1. fig. 19 (1844) [1].

Eucalodium boucardi, var. β, Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 381, t. 15. figg. 6, 6 *a* [2]; Strebel, Beitr. Mex. Land- und Süssw.-Conch. iv. p. 71, t. 6. fig. 6 [3].

Hab. E. Mexico: Cordova (*Sallé* [2]; *Höge*); Coatepec (*Höge*); Jalapa and Cuesta de Misantla (*M. Trujillo*).

Var. *boucardi*.

Cylindrella boucardi (Sallé), Pfr. P. Z. S. 1856, p. 321, t. 35. fig. 1 [4]; Malak. Blätt. iii. p. 216 (1856) [5]; Monogr. Helic. Vivent. iv. p. 695 [6]; Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, *Cylindrella*, p. 35, t. 8. figg. 1, 2 [7].

Eucalodium boucardi, Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 381 [8]; Strebel, Beitr. Mex. Land- und Süssw.-Conch. iv. p. 70, t. 5. fig. 15 [9].

Hab. E. Mexico: Cordova (*Sallé* [4–7]); Orizaba (*Botteri* [8]).

Var. *strebeli*, n.

Eucalodium boucardi, form B, Strebel, loc. cit. p. 71, t. 5. figg. 8, 9 [10].

Hab. E. Mexico: Environs of Jalapa, especially about the brooks on the road to Naolingo, and Chirimoyo (*Strebel* [10]).

Var. *minimum*.

Eucalodium boucardi, var. γ, Fisch. & Crosse, loc. cit. p. 381 [11].

Hab. E. Mexico: Cordova (*Sallé* [11]; *Höge*); Atoyac (*H. H. Smith*).

? Var. *fischeri*, n.

Eucalodium speciosum (Dkr.), Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 379, t. 15. figg. 7, 7 *a* [12].

Hab. E. Mexico: Chiquihuitl, in the State of Vera Cruz (*Sallé* [12]).

13. Eucalodium edwardsianum.

Eucalodium edwardsianum, Crosse & Fisch. Journ. de Conch. xx. p. 224 (1872) [1]; Miss. Scient. Mex., Mollusca, i. p. 383, t. 14. figg. 10, 10 *a* [2]; Strebel, Beitr. Mex. Land- und Süssw.-Conch. iv. p. 69, t. 6. fig. 11, t. 11. figg. 6, 7 (radula), and 13 (jaw), t. 12. fig. 1 (genitalia) [3].

Cylindrella edwardsiana, Pfr. Monogr. Helic. Vivent. viii. p. 437 [4].

Hab. E. Mexico: Cordova (*Sallé* [1 2]); Agua Caliente, Hirial, and Nacimiento de Quilate, all around Misantla, by preference on a tree called "Calatola or tisma" (*Doña Estefania* [3]).

The more distant costæ without intervening spiral striæ appear to be the chief character by which this species may be known from *E. boucardi*. I have not, however, seen a specimen which I can refer with certainty to it.

The specimen described and figured by the French authors is rather swollen in the middle, those of Strebel being more cylindrical. Strebel [3] has counted 77 costæ in the penultimate whorl.

14. **Eucalodium deshayesianum.**

Eucalodium deshayesianum, Crosse & Fisch. Journ. de Conch. xx. p. 223 (1872) [1]; Miss. Scient. Mex., Mollusca, i. p. 384, t. 14. figg. 9, 9 *a* [2].

Cylindrella deshayesiana, Pfr. Monogr. Helic. Vivent. viii. p. 430 [3].

Hab. E. Mexico: probably Chiapas or Tabasco (*Ghiesbreght* [1–3]).

Differs from the allied forms by the very feeble sculpture.

15. **Eucalodium cereum.**

Eucalodium cereum, Strebel, Beitr. Mex. Land- und Süssw.-Conch. iv. p. 72, t. 6. fig. 9 [1].

Hab. E. Mexico: San Antonio del Monte, near Naolingo, on the road to Misantla (*Strebel* [1]); Coatepec (*Höge*).

Agrees in sculpture with *E. boucardi*; but the aperture is less produced and less bent backwards, the form is more swollen, and the visible part of each whorl is lower in proportion to its height.

16. **Eucalodium moussonianum.**

Cylindrella decollata, var. *β*, Pfr. Monogr. Helic. Vivent. ii. p. 368 (1848) [1].

Cylindrella speciosa (Dkr.), Pfr. Malak. Blätt. iii. p. 216 (1856) [2]; Monogr. Helic. Vivent. iv. p. 695 [3]; and in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, *Cylindrella*, p. 34, t. 1. figg. 3, 4 [4].

Eucalodium moussonianum, Crosse & Fisch. Journ. de Conch. xx. p. 225 (1872) [5]; Miss. Scient. Mex., Mollusca, i. p. 375, t. 14. figg. 11, 11 *a* [6]; Strebel, Beitr. Mex. Land- und Süssw.-Conch. iv. p. 67, t. 5. fig. 16, and t. 13. fig. 14 [7].

Eucalodium boucardi, var. *δ*, Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 381 [8].

Hab. Mexico (*Cuming, in coll. Albers*): probably State of Vera Cruz (*Sallé* [6]).

Agrees in its malleated sculpture, as well as in colour, with *E. blandianum*, but is much shorter and comparatively broad, with a more rounded aperture.

The locality "Colombia" given by Pfeiffer [1–4] is probably a mistake.

17. **Eucalodium neglectum.**

Eucalodium neglectum, Crosse & Fisch. Journ. de Conch. xx. p. 302 (1872) [1]; Miss. Scient. Mex., Mollusca, i. p. 373, t. 14. figg. 8, 8 *a* [2]; Strebel, Beitr. Mex. Land- und Süssw.-Conch. iv. p. 67, t. 13. fig. 15 [3].

Cylindrella neglecta, Pfr. Monogr. Helic. Vivent. viii. p. 429 [4].

Hab. S. Central Mexico: Oaxaca (*Boucard* [1 2]).

Distinct by the comparatively very small aperture; colour as in the preceding species.

The specimen from Albers's collection, figured by Strebel [3], is before me, and I have no doubt that it belongs to the species described by Crosse and Fischer, differing only in being a little longer and less ventricose, but with the same number of preserved whorls (9).

18. **Eucalodium truncatum.** (Tab. XVI. figg. 3–9.)

Bulimus truncatus, Pfr. Symb. Hist. Helic. i. p. 43 (1841) [1]; Philippi's Abbild. neuer Conch. i. p. 55, t. 1. fig. 8 [2]; Monogr. Helic. Vivent. ii. p. 154 [3], and viii. p. 131 [4]; Malak. Blätt. xxii. p. 37 (1872) [5]; Reeve, Conch. Icon. v., *Bulimus*, t. 70. fig. 1 (nec t. 69. fig. 498) (young specimen) [6].

Cylindrella truncata (Pfr.), v. Mart. Malak. Blätt. xii. p. 13 (1865) [7].

Eucalodium truncatum, Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 392 [8].

Eucalodium martensii, Strebel, Beitr. Mex. Land- und Süssw.-Conch. iv. p. 73, t. 13. fig. 13, t. 11. figg. 8 (radula) and 14 (jaw), t. 12. fig. 3 (genitalia) [9].

Hab. Central Mexico: Angangueo, in the State of Michoacan, under the leaves of *Agave americana* (*Hegewisch* [1–3]).

S.W. Mexico: Omilteme, in the State of Guerrero (*H. H. Smith*).

Mexico: without nearer indication of locality (*Uhde*).

Mr. H. H. Smith having obtained several specimens of this interesting species in Guerrero, I am now able to give a fresh description and figure of it:—

Adult shell cylindrical-turrite, with close-set very fine striæ, which are more oblique in the upper half, more vertical in the lower half of the visible part of each whorl, glossy, greenish-brown, white at the suture. Remaining whorls $6\frac{1}{2}$–8; on the upper whorls the striæ are comparatively stronger (so much elevated that the sculpture might be termed costulate), a little rough, and more equally oblique, being more vertical just above the suture only. The upper whorls are also distinctly more convex than the lower ones. Aperture very little produced beyond the suture, nearly circular, but rectilinear above, where it is nearest the preceding whorl, and making here a very obtuse angle with the strongly arcuated outer margin; peristome continuous, as usual in this genus, very shortly expanded, obtuse, white; columellar margin also well arcuated, but behind it, in the depth of the aperture, is a distinct white fold, rising up very steeply, without angle. Young specimens (figg. 8, 9) are somewhat concavely turrite, and resemble the figure 8 *c* in Philippi's 'Abbildungen'; they indicate that the whole number of whorls is at least 14 or more, but even in these the tip is truncated and the hole filled up by a convex whitish wall. The dimensions of the adult specimens (with continuous, expanded, and slightly produced peristome) are somewhat different, as shown by the following measurements:—

The largest (8 whorls).....	35 millim.	long.,	diam.	$9\frac{1}{2}$	;	aperture	$7\frac{1}{2}$	long (high),	7	broad (diam.).
The smallest ($7\frac{1}{2}$ whorls).....	$24\frac{1}{2}$	,,	,,	8	;	,,	6	,,	6	,,
The most slender one (8 whorls)..	$25\frac{1}{2}$	,,	,,	7	;	,,	6	,,	6	,,

Cylindrella transaperta, Sowerby, in Reeve's Conch. Icon. xx., *Cylindrella*, t. 9. fig. 77, locality unknown, perhaps belongs to this species.

19. **Eucalodium recticosta.**

Cylindrella recticosta, Pfr. in Philippi's Abbild. neuer Conch. ii. p. 48, t. 2. fig. 3 (1847)[1]; Monogr. Helic. Vivent. ii. p. 369[2]; in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, *Cylindrella*, p. 8, t. 1. figg. 21, 22[3]; Sowerby, in Reeve's Conch. Icon. xx., *Cylindrella*, t. 13. fig. 119[4].

Eucalodium recticosta, Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 386, t. 14. figg. 12, 12 *a*, *b*[5].

Hab. W. Mexico: Culata, near Manzanillo, in the State of Colima (*W. Lloyd*).
S.E. Mexico (*Ghiesbreght*[5]).
S. Central Mexico: Oaxaca[4].

Pfeiffer describes the aperture as "oblique ovalis," and gives its length as $9\frac{1}{2}$, and the breadth $7\frac{1}{2}$ millim., and this agrees with his figure[1]; but the shell as figured is somewhat turned to the left, so that the real breadth is foreshortened. In a specimen from Paetel's collection, agreeing in all other respects with Pfeiffer's description, the aperture is circular, as broad as long, and it is also so described and figured by Fischer and Crosse[5].

20. **Eucalodium strebeli.** (Tab. XVI. figg. 31–34.)

Anisospira strebeli, Pfeffer, Verh. Ver. f. naturw. Hamb. 1887, p. 21[1].

Testa fusiformis, plus minusve tumida, costulis planis paulum obliquis vix arcuatis sat confertis sculpta, opaca, fulvido-rubella; sutura instricta, angustissime alba; anfr. superstites 8–9, convexiusculi, supremi rapide attenuati, 4–5 sequentes diametro subæquales, penultimus jam angustior, ultimus magis angustatus, versus basin sensim attenuatus, carina basali obsoleta usque ad aperturam continua (interdum fusco-unifasciata); apertura paulo ultra suturam producta, ovato-rotundata, supra extrorsum obtusangula, ad insertionem subrectilinea; peristoma crassum, breviter expansum, plica columellari profunda, valde ascendente, non angulata.

a.	Long.	50,	diam.	15;	apert. long.	$11\frac{1}{2}$,	diam.	10	millim.
b.	„	43,	„	14;	„	11,	„	10	„
c.	„	40,	„	12;	„	10,	„	9	„
d.	„	38,	„	13;	„	10,	„	9	„
e.	„	33,	„	12;	„	9,	„	$8\frac{1}{2}$	„

Hab. S.W. Mexico: Cerro de Plumas, near Puerto Angel, on the Pacific coast, in the State of Oaxaca, in a dense tropical forest (*Höge*).

Very variable. The five specimens, the dimensions of which are given above, are singled out from about thirty, among which we find all degrees of transition, so that not even varieties can be determined. The larger and most cylindrical ones, as *a* and *c*, resemble in general shape the club-like turreted *E. ghiesbreghti* and *E. decollatum*, except that the uppermost of the remaining whorls are much narrower; the shortest and most swollen one, *e*, is very like *E. liebmanni*, but differs from it in the costulate sculpture. The most rapid diminution in diameter is seen in the sixth, seventh, or eighth whorl, numbered from below. Three, four, or even nearly five whorls are of almost equal diameter before the penultimate one. The aperture in some specimens is

of a nearly upright oval or pear-shaped form, with the obtuse angle pointing upwards (figg. 33, 34), or it is more or less oblique and triangular, the angle pointing outwards and the rectilinear upper part of the peristome extending further in a transverse direction (fig. 31). A somewhat similar variation is also to be found in other species, when sufficient specimens are at hand for examination. The colour is generally dull brownish or greyish-red, not glossy, in specimen *e* only yellowish-white. In the sculpture there is not much variation; several specimens, however, show a few malleate (hammer-like) impressions; the interstices are generally nearly twice as broad as the costæ (fig. 33).

A worn specimen found by Mr. W. Lloyd at Culata, near Manzanillo, on the west coast of Mexico, probably belongs to this species.

Cylindrella (*Urocoptis*) *cylindrus*, Chemn., from Jamaica, resembles this species in general shape and in colour; but has a much more feeble sculpture, a broader peristome, and a stronger and distinctly prominent keel at its base.

21. **Eucalodium liebmanni.**

Cylindrella liebmanni, Pfr. Zeitschr. für Malak. 1846, p. 159 [1]; in Philippi's Abbild. neuer Conch. iii. p. 5, t. 3. fig. 1 [2]; Monogr. Helic. Vivent. ii. p. 370 [3]; Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, *Cylindrella*, p. 4, t. 1. figg. 9, 10 [4]; Sowerby, in Reeve's Conch. Icon. xx., *Cylindrella*, t. 13. fig. 46 ("*leibmanni*") [5].

Eucalodium liebmanni, Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 390, t. 15. figg. 10, 10 *a*, *b* [6].

Anisospira liebmanni, Strebel, Beitr. Mex. Land- und Süssw.-Conch. iv. p. 79, t. 5. figg. 12, 12 *a*, 13, and t. 14. figg. 2 A, B [7].

Cylindrella trochæformis, Sowerby, in Reeve's Conch. Icon. xx., *Cylindrella*, t. 9. fig. 80 (young state) [8].

Hab. S.W. Mexico: Barrio and Juchitan, Isthmus of Tehuantepec (*Sumichrast* [4 6 7]).
Mexico (*Liebmann* [1]).

22. **Eucalodium hyalinum.**

Cylindrella hyalina, Pfr. in Philippi's Abbild. neuer Conch. ii. p. 47, t. 2. fig. 2 (1847) [1]; Monogr. Helic. Vivent. ii. p. 369 [2]; in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, *Cylindrella*, p. 8, t. 1. figg. 13, 14 [3]; v. Mart. in Malak. Blätt. xii. p. 14 (1865) [4]; Sowerby, in Reeve's Conch. Icon. xx., *Cylindrella*, t. 12. fig. 110 [5].

Eucalodium hyalinum, Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 388, t. 15. figg. 9, 9 *a* [6].

Anisospira hyalina, Strebel, Beitr. Mex. Land- und Süssw.-Conch. iv. p. 79, t. 13. fig. 16 [7].

Hab. S. Central Mexico: Oaxaca, in woods (*Deppe* [4 6 7]).
S.E. Mexico: probably Tabasco or Chiapas (*Ghiesbreght* [6]).

CŒLOCENTRUM.

Eucalodium, sect. 2, Crosse & Fischer, Journ. de Conch. xviii. p. 22 (1868).
Cœlocentrum, Crosse & Fischer, Journ. de Conch. xx. p. 302 (1870); Miss. Scient. Mex., Mollusca, i. p. 339; Strebel, Beitr. Mex. Land- und Süssw.-Conch. iv. p. 56.

Characterized by the hollow columellar axis, in other respects very near *Eucalodium*. The hollowness of the columella cannot be seen at the base of the adult shell, where it is reduced to a very small slit, or even closed, as in *Eucalodium*; but it is visible in all specimens on the upper truncate end of the shell, where it appears as a round exactly central hole. The outside of the columella is ordinarily sculptured by descending plaits or costæ, but this can only be seen by breaking a hole into the shell. Moreover, the whorls are generally closer together than in *Eucalodium*, *i. e.* the height of the visible part of each whorl is less in relation to its diameter; the general outline is more fusiform—swollen in the middle, attenuated at both ends; and the aperture is still smaller in comparison to the diameter. The colour in most of the species is brownish-yellow, without red or violet hue. Jaw smooth, with median projection. Teeth of the radula as in *Eucalodium*.

The geographical distribution of *Cœlocentrum* is also similar to that of *Eucalodium*. With one exception, *C. irregulare*, Gabb, from Moleje in "Mexican California," all the known species are peculiar to Central America; but the northern limit, as well as the southern, slightly exceeds that of *Eucalodium*, the southernmost species being *C. championi*, from Cerro Zunil, on the Pacific slope of Guatemala.

The species may be arranged for easier recognition into four subdivisions:—

1. Shell large, subturrite, with feeble, somewhat irregular costæ and distinct spiral striæ between them: length 54–80 millim.—*gigas, championi, clathratum, anomalum*.
2. Shell more swollen, spindle-shaped (fusiform), its greatest diameter not in the penultimate whorl, but higher upwards; costæ feeble, close together: length 34–54 millim.—*turris, clava, tomacella*.
3. Shell small, more cylindrical, also with close feeble costæ, dull coloured: length 20–30 millim.—*arctispira, fistulare*.
4. Shell small, with comparatively strong costæ, dark reddish-brown in colour: length 20–30 millim.—*crosseanum, filicosta*.

1. **Cœlocentrum gigas**, sp. n. (Tab. XVI. figg. 27, 28, 28 *a*, *b*, *c*.)

Shell measuring 21 millim. in diameter and 80 millim. in length (truncate), yellowish-grey, with numerous rather fine, somewhat arcuated costulæ, of which there are 98 on the whorl before the last, somewhat unequal and irregular, the interstices twice or thrice their breadth; spiral striæ in the interstices very feeble, none on the costulæ (fig. 28 *b*). Whorls a little convex, numbering 12 in the adult truncate example, about 24 in all, to judge from comparison with a young specimen; the height of the visible part of a whorl varying from $\frac{2}{5}$ to $\frac{1}{3}$ of its diameter, the middle whorls being not so high as the upper and lower ones; the last seven whorls nearly equal in diameter, the preceding ones gradually diminishing upwards, so that the whole shell is turrite, but not properly fusiform. Base of the last whorl rounded, with a rather broad and shallow spiral furrow in the prolongation of the suture, instead of the usual angular line (fig. 28 *b*). The aperture, in the single, perhaps not quite perfect, adult specimen is scarcely

Comparative Table of the Species of *Cœlocentrum*.

Nomen.	Forma.	Sculptura.	Coloratio.	Apertura.	Columella.	Anfr. super stites.	Long.	Diamet.		Aperturæ.		Patria.
								Max.	Anfr. penult.	Long.	Diam.	
gigas, *v. Mart.*	obese turrita, basi sulco spirali limbata.	inæqualiter costulata et levissime spiratim striatula.	griseo-flavescens.	vix protracta, infra subangulata.	costis sat validis obliquis.	mm. 12	mm. 80	mm. 21	mm. 21	mm. 17	mm. 16	E. Guatemala.
championi, *v. Mart.*	obese turrita, linea angulari basali.	confertim costulata, leviter spiratim striatula.	„	sat protracta, supra et infra angulata.	costulis obsoletis obliquis.	?	?	14	14	13½	12	W. Guatemala.
clathratum, *v. Mart.*.....	obese turrita, basi subangulata.	crispato-costulata, leviter spiratim striatula.	„	valde protracta, supra et infra angulata.	costis obliquis, infra tumidis.	10	54	14	13½	12	9	W. Guatemala.
anomalum, *Streb.*.....	„	irregulariter costulata, obsolete spiratim striatula.	olivaceo-chocolatina, basi carnea.	modice protracta, perobliqua, subtus angulata.	costulis confertis numerosis.	13	54	13½	13½	10	10½	N. Guatemala.
turris, *Pfr.*.....	fusiformi-turrita, basi angulata.	confertim arcuato-costulata.	fusco-flavescens.	sat protracta, supra subangulata, infra angulato-rostrata.	costis validis obliquis, infra angulatis.	16–24	59–72	14–15	12½–14	10–10½	9–10	S.E. Mexico.
clava, *Pfr.*	subfusiformi-turrita, basi angulata.	„	pallide grisea.	„	„	15–20	40–37	10–11½	9–10	6½–7½	6–7½	S.E. Mexico.
——, var. rufescens, *v. Mart.*	„	„	pallide rufescens, sutura alba.	valde protracta, supra subangulata, infra angulato-rostrata.	„	15	42	8½	7	6	5½	Mexico.
tomacella, *Morel.*	fusiformi-turrita, basi angulata.	„	flavescens.	sat protracta, supra et infra angulata.	costis debilibus.	12–14	31–35	10–11	9–10	6–7	5¼–6¼	S.E. Mexico & ? N. Guatemala.
arctispira, *Pfr.*	subfusiformi-turrita, basi rectangula.	confertim costulato-striata.	griseo-fuscescens.	sat protracta, supra subangulata, infra subangulata vel rotundata.	costis subperpendicularibus, infra angulatis.	16–20	25–36	7–10	5½–8½	4–6	4–5⅓	E., S.E., & S.W. Mexico.
fistulare, *Morel*.....	obese turrita, basi subangulata.	confertissime striata.	„	modice protracta, supra et infra subangulata.	costis validis obliquis.	9–12	21½–28	6½–8	6–8	4–5½	4–5¼	N. Guatemala.
crosseanum, *Pfr.*	obese turrita, basi angulata angulo evanescente.	costis distinctis, sat densis, obliquis.	rufo-fusca.	modice protracta, supra subangulata, infra rotundata.	costis subperpendicularibus.	10–12	26½–30	8–9½	7–8½	5½–7	5½–6	E. Mexico.
filicosta, *Shuttl.*.....	„	costis distinctis, minus densis, arcuato-verticalibus.	nitide rufo-fusca, costis pallidis.	„	costulis obliquis.	9½–13	22½–26	7–8	6½–7½	4–5	4–5	E. Mexico.

produced beyond the suture, and its edges are very thin and shortly expanded; the opening is 17 millim. high and 16 millim. broad, irregularly rhomboidal, with an obtuse angle at the base, but rounded above. The columellar plait inside the aperture is rather strong, pale orange, and ascends in a straight oblique line. The costulæ of the columellar axis are numerous, about as broad as their interstices, and descend in a straight line.

Fig. 27 represents a younger individual, which has not yet lost so many whorls.

Hab. E. GUATEMALA: Livingston, in the Bay of Honduras (*O. Stoll*).

2. **Cœlocentrum championi,** sp. n. (Tab. XVI. figg. 26, 26 *a*, *b*, *c*.)

One broken specimen, somewhat intermediate between *C. gigas* and *C. clathratum*; 14 millim. in diameter, of a yellowish-grey colour, white at the suture; costulæ more feeble and numerous, above 100 in the whorl before the last, the interstices of the same width, or scarcely twice as broad; spiral striæ very faint, not crossing the costulæ (fig. 26 *b*). The 3–4 terminal whorls of equal diameter. An angular line and beneath it a very shallow furrow at the base of the last whorl, more feeble near the aperture. Costulæ at the outside of the columellar axis very faint. Aperture protracted 4 millim. beyond the suture, obliquely oval, angulate above and below, $13\frac{1}{2}$ millim. in oblique height and 11 millim. in breadth; peristome thickened, expanded, white.

Hab. W. GUATEMALA: Cerro Zunil (*Champion*).

3. **Cœlocentrum clathratum.** (Tab. XVI. figg. 29, 29 *a*, *b*, *c*, 30.)

Cœlocentrum clathratum, v. Mart. Sitz.-Bericht d. Ges. naturf. Freunde, Berlin, 1886, p. 161[1].

More turrite than fusiform, in this respect resembling the preceding (*C. championi*), but of a paler yellowish-grey colour, the costulæ also feeble and somewhat more oblique in the lower whorls, 87–90 in the whorl before the last, also somewhat unequal, the interstices mostly twice as wide as the costulæ; the spiral striæ fine, traversing not only the interstices, but also the costulæ themselves and giving to them an irregular, waved appearance. Whorls scarcely convex, 10 remaining in the adult shell, the terminal 3–4 of equal diameter, the last at the base with a very feeble angular line, which quite disappears near the aperture. Umbilical rim arcuated. Costulæ of the columellar axis very faint, scarcely visible. Aperture protracted $4\frac{1}{2}$ millim. beyond the suture, obliquely oval, somewhat angulated above and below; peristome thin, a little expanded. Length of the truncate shell 54, diameter 14 millim.; aperture 12 long, 9 broad.

Hab. W. GUATEMALA: Hacienda Buenavista in Upper Cholhuitz, Costa Cuca, at an elevation of 3500 feet above the sea (*O. Stoll*[1]).

Dr. O. Stoll has made a drawing of the living animal (fig. 30) and describes it as follows:—"Body slender, higher in its posterior part, flat and obtusely rounded behind; face higher than broad, convex, obliquely sloping, produced into a sort of trunk. Length of the body 38 millim., breadth 17; length of the upper feelers 9, of the lower 2; height of the face 7, breadth of the same 5 millim. Colour of the body whitish-grey, with a slight bluish hue; on the face and on the anterior part of the back are small oblong dark brown spots in longitudinal rows, corresponding to the tubercles of the skin; at the lateral edges very pale brown roundish spots; underside of the foot whitish-grey; feelers slender, pale brown; eyes small, black." The animal moves by extending the fore part of the body to a considerable length and then the hinder part with the shell is advanced by contraction. In dry weather it buries itself in the ground.

4. Cœlocentrum anomalum.

Cœlocentrum anomalum, Strebel, Beitr. Mex. Land- und Süssw.-Conch. iv. p. 59, t. 6. fig. 8, and t. 14. fig. 5 (1880) [1].

Hab. N. Guatemala: Coban (*Sarg* [1]).

Differs from all others of the genus in its violet-chocolate colour; base of the last whorl dirty flesh-coloured. Aperture very oblique and comparatively small. In other respects not unlike *C. clathratum*.

5. Cœlocentrum turris.

Cylindrella turris, Pfr. P. Z. S. 1856, p. 380, t. 36. fig. 2 [1]; Malak. Blätt. iii. p. 217 (1856) [2]; Monogr. Helic. Vivent. iv. p. 695 [3]; in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, *Cylindrella*, p. 35, t. 8. figg. 20, 21 [4]; Bland, Ann. Lyc. New York, viii. p. 160 (1865) [5]; Sowerby, in Reeve's Conch. Icon. xx., *Cylindrella*, t. 13. fig. 117 [6].

Eucalodium turris, Crosse & Fisch. Journ. de Conch. xvi. p. 88 [7], and xviii. p. 22 [8].

Cœlocentrum turris, Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 345, t. 15. figg. 13, 13 *a*, *c*, 13 *b* (columellar axis) [9]; Strebel, Beitr. Mex. Land- und Süssw.-Conch. iv. p. 56, t. 5. fig. 18, and t. 14. figg. 2 A, B (columellar axis) [10].

Hab. S.E. Mexico: Chiapas (*Ghiesbreght* [1–4 8 9]).

Varies in the length of the adult shell from 59–72 millim., and in the breadth of the penultimate whorl from 12½–14 millim. Number of preserved whorls 16–24. The variation in the length of the adult shell does not depend entirely upon the number of preserved whorls: I have before me a specimen measuring 61 millim. with 16 preserved whorls, and another of 60 millim. with 19 preserved whorls. The greater the number of preserved whorls, the more strongly is the shell attenuated upwards.

The figure in Reeve's 'Conchologia Iconica,' 77 millim. long, represents a specimen with an unusually large number of preserved whorls, viz. 27.

6. Cœlocentrum clava.

Cylindrella clava, Pfr. P. Z. S. 1856, p. 380, t. 36. fig. 3 [1]; Malak. Blätt. iii. p. 217 (1856) [2]; in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, *Cylindrella*, p. 36, t. 8. figg. 11, 12 [3]; Monogr. Helic. Vivent. iv. p. 696 [4]; Bland, Ann. Lyc. New York, viii. p. 160 (1865) [5]; Sowerby, in Reeve's Conch. Icon. xx., *Cylindrella*, t. 13. figg. 115 *a*, *b* [6].

Eucalodium clava, Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 346, t. 15. fig. 14 [7]; Strebel, Beitr. Mex. Land- und Süssw.-Conch. iv. p. 57, t. 5. fig. 10, and t. 14. fig. 8 (columellar axis) [8].

Hab. S.E. Mexico: Chiapas (*Ghiesbreght* [1–4 7 8]).

Very near *C. turris*, but smaller, varying in the total length from 40–57 millim., and in the breadth of the penultimate whorl from 9–10 millim. Number of preserved

whorls 15–20 (12 in a specimen mentioned by Strebel [8], the length of which is $35\frac{1}{2}$ millim.).

The figure *b* in Reeve's 'Conchologia Iconica' represents a specimen which is not truncated at all, 63 millim. in length, with 31 whorls.

Var. *rufescens*, n. (Tab. XVI. fig. 2.)

Smaller and more cylindrical, pale reddish-brown, the aperture more protracted ($3\frac{1}{2}$ millim.) and comparatively smaller. Length 42 millim.; diameter of the penultimate whorl 8, largest diameter (third whorl before the last) $8\frac{1}{2}$ millim.; preserved whorls 15; aperture 6 millim. long, $5\frac{1}{2}$ broad.

Hab. MEXICO: one specimen in Pätel's collection.

7. Cœlocentrum tomacella.

Cylindrella tomacella *, Morelet, Test. Noviss. i. p. 10 (1849) [1]; Pfr. Monogr. Helic. Vivent. iii. p. 568 [2]; Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, *Cylindrella*, p. 36, t. 4. figg. 19, 20 [3]; Sowerby, in Reeve's Conch. Icon. xx., *Cylindrella*, t. 14. fig. 124 [4].

Cylindrella moreleti (non Pfr.), Deshayes, in Férussac's Hist. Nat. Moll. Terr. ii. p. 227, t. 164. figg. 16–18 [5].

Cœlocentrum tomacella, Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 342, t. 15. fig. 11 [6]; Strebel, Beitr. Mex. Land- und Süssw.-Conch. iv. p. 58, t. 6. fig. 3 [7].

Hab. S.E. MEXICO: woods of Tabasco, and in the ruins of Palenque, State of Chiapas (*Morelet* [1–6]).

? N. GUATEMALA: Coban (*Sarg* [7]).

Obs.—*Cylindrella attenuata*, Pfr. Malak. Blätt. iii. p. 258 (1857); Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, *Cylindrella*, p. 37, t. 9. figg. 1, 2; Monogr. Helic. Vivent. iv. p. 698; Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 404, found in Chiapas by Ghiesbreght, and known from one specimen only, looks very like a non-decollate specimen of *Cœlocentrum tomacella*.

8. Cœlocentrum arctispira.

Cylindrella arctispira, Pfr. P. Z. S. 1860, p. 139, t. 50. fig. 2 [1]; Malak. Blätt. viii. p. 59 [2]; Monogr. Helic. Vivent. vi. p. 377 [3]; Sowerby, in Reeve's Conch. Icon. xx., *Cylindrella*, t. 14. fig. 123 [4].

Cœlocentrum arctispirum, Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 348, t. 15. figg. 15, 15 *a* [5]; Strebel, Beitr. Mex. Land- und Süssw.-Conch. iv. p. 58, t. 6. figg. 4 (two figures), t. 11. figg. 9 (radula), 15 (jaw), t. 13. fig. 6 (anatomy), t. 14. fig. 3 (columellar axis) [6].

Cylindrella acutispira (misprint), Pätel, Catalog der Conch.-Samml. ed. 2, p. 245 (1889) [7].

Hab. E. MEXICO: Quilate, Agua Caliente, and Arroyo del Banco, all in the environs of Misantla (*Doña Estefania* [7]).

S.E. MEXICO: Istapa, in the State of Tabasco (*Sallé* [5]).

S.W. MEXICO: Juquila, in the State of Oaxaca (*Boucard* [1–3 5]).

* "*Tomaculum*," a sort of sausage (Juvenal, Satyr. x. v. 355).

Distinct by the remarkable narrowness of the whorls, the height of the visible part of the middle ones being scarcely $\frac{1}{3}$ of their diameter.

9. Cœlocentrum fistulare.

Cylindrella fistularis, Morelet, Test. Noviss. i. p. 10 (1849) [1]; Pfr. Monogr. Helic. Vivent. iii. p. 569 [2]; Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, *Cylindrella*, p. 38, t. 4. figg. 21, 22 [3].

Cœlocentrum fistulare, Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 343, t. 15. figg. 12, 12 *a* [4]; Strebel, Beitr. Mex. Land- und Süssw.-Conch. iv. p. 58, t. 6. fig. 2, t. 14. figg. 1 A, B (columellar axis) [5].

Cylindrella arctispira, Tristram, P. Z. S. 1863, p. 412 (nec Pfr.) [6].

Hab. N. Guatemala: forests of Peten (*Morelet* [1–4]); Vera Paz (*Salvin* [6]); Coban (*Sarg* [5]).

The specimen from Vera Paz determined as *Cylindrella arctispira* by Tristram [6] is now before me, and I am able to state that it belongs to *C. fistulare*, Morel.

10. Cœlocentrum crosseanum.

Cylindrella crosseana, Pfr. Journ. de Conch. xv. p. 437 (1867) [1]; Monogr. Helic. Vivent. vi. p. 378 [2]; Novitat. Conch. p. 437, t. 97. figg. 26, 27 [3].

Eucalodium crosseanum, Crosse & Fisch. Journ. de Conch. xviii. p. 22 [4].

Cœlocentrum crosseanum, Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 351, t. 15. figg. 16, 16 *a* [5]; Strebel, Beitr. Mex. Land- und Süssw.-Conch. iv. p. 60, t. 6. figg. 1 *a–d* and 5, t. 14. figg. 4 and 7 A, B (columellar axis) [6].

Hab. E. Mexico: Orizaba (*Botteri* [1–6]); Cuautlatitlan, between Jico and Perote, N. of Orizaba (*Doña Estefania* [6]).

11. Cœlocentrum filicosta.

Cylindrella filicosta, Shuttleworth, Diagn. neuer Moll. iii. p. 36 (Mittheil. der naturf. Ges. in Bern, 1852, p. 296) [1]; Pfr. Monogr. Helic. Vivent. iii. p. 573 [2]; Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, *Cylindrella*, p. 19, t. 2. fig. 30, and t. 8. figg. 9, 10 [3]; Sowerby, in Reeve's Conch. Icon. xx., *Cylindrella*, t. 12. fig. 107 [4].

Eucalodium filicosta, Crosse & Fisch. Journ. de Conch. xviii. p. 22 (1870) [5].

Cœlocentrum filicosta, Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 352, t. 15. figg. 17, 17 *a* (columellar axis) [6]; Strebel, Beitr. Mex. Land- und Süssw.-Conch. iv. p. 61, t. 5. fig. 14 [7].

Hab. E. Mexico: Cordova (*Jacot-Guillarmod and Sallé* [1–7]).

Obs.—*Cylindrella aristispira* (ear-spike), Sowerby, in Reeve's Conch. Icon. xx., *Cylindrella*, t. 1. fig. 5, locality unknown, has much the appearance of a *Cœlocentrum*, but I cannot refer it to any of the above species.

HOLOSPIRA.

Cylindrella, subgen. *Holospira*, v. Martens, in Albers's Die Heliceen, ed. 2, p. 39 (1860).

Shell ovate, fusiform, or turrite, preserving all the whorls (or nearly so) in the adult state; aperture with continuous, somewhat expanded peristome, more or less protracted beyond the suture of the last whorl (except in *H. tryoni*, var. *appressa*). Columellar axis hollow. Only longitudinal (vertical) sculpture. Coloration mostly uniform, pale. Size moderate.

Confined to Central America, Mexico, and the Southern States of North America.

Subgen. HOLOSPIRA, s. str.

Cylindrella, subgen. *Acera*, Albers, Die Heliceen, ed. 1, p. 209 (1850) (nec Cuvier).

Holospira, Crosse & Fischer, Journ. de Conch. xviii. p. 13 (1870); Miss. Scient. Mex., Mollusca, i. p. 318.

Holospira, Metastoma, and *Bostrichocentrum*, Strebel, Beitr. Mex. Land- und Süssw.-Conch. iv. pp. 80–82 (1880).

Shell ovate or moderately turrite, often with the largest diameter higher up than in the penultimate whorl—fusiform at the middle and clavate near the upper third—composed of 11–19 whorls, the upper ones increasing rapidly and forming a short conical upper end, as in *Pupa*, the middle ones increasing very slowly or not at all; where this difference is very marked, the shell looking like a tower with a rather low roof, it may be called *tectiform*. Aperture not very much protracted, often obliquely pear-shaped, having the upper margin straight and the upper outer corner pointed and projecting. This angle is usually continued on the protracted part of the last whorl as a light keel (dorsal keel), while the base of the last whorl is in most species rounded, or compressed and keeled; the basal keel more or less disappears near the aperture. Columellar axis forming a rather wide hollow tube in the interior of the shell, smooth externally, narrowing at the base and usually opening in a narrow chink, in one species only as a round, comparatively large hole (umbilicus). Spiral lamellæ in some species well developed within the second or third whorl before the last, in others rudimentary or wanting. Teeth of the radula often somewhat pointed, more than in the subgenus *Epirobia* (Fischer & Crosse, Miss. Scient. Mex., Mollusca, i. t. 16. figg. 7, 9; Strebel, Beitr. Mex. Land- und Süssw.-Conch. iv. t. 13. fig. 1).

Geographical range extending from Mexico into Texas, Arizona, and Lower California, but not reaching Guatemala in the south. These shells are found chiefly on the elevated central plateau, on Cactaceæ, and apparently occur, when found, in considerable numbers. But they have been met with hitherto in very few localities, and as several of them vary considerably in the proportion of the length to the diameter of the shell in the same locality, the species are rather difficult to separate in some instances.

1. **Holospira imbricata.** (Tab. XVI. fig. 25.)

Cylindrella (*Holospira*) *imbricata*, v. Mart. Malak. Blätt. xii. p. 15, t. 1. figg. 2, 3 (1865) [1]; Pfr. Monogr. Helic. Vivent. vi. p. 390 [2].

Holospira imbricata, Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 336 [3].

Hab. MEXICO, without nearer indication of locality (*Uhde* [1–3]).

This very distinct species does not appear to have been found by any subsequent collector; it differs from all others of the genus in the short, club-like form of the

Comparative Table of the Species of *Holospira*, sensu stricto.

Nomen.	Forma.	Sculptura.	Coloratio.	Apertura.	Umbilicus.	Anfr.	Long.	Diam.		Aperturæ.		Patria.
								Max.	Anfr. penult.	Long.	Lat.	
imbricata, *v. Mart.*	obovata, ventrosa, supra tectiformis.	suboblique costulata.	griseo-albida.	parva, anguste piriformis.	clausus.	16 imbricati.	mm. 16	mm. 8	mm. 5½	mm. 4	mm. 3	Mexico.
tryoni, *Pfr.*	cylindrico-obovata, supra tectiformis.	subtiliter conferte striatula.	alba, apice flavescente.	modice subcircularis.	perforato-rimatus.	15	13½	5⅔	4½ ?	2½	2½	Central Mexico.
——, var. gealei, *H. Ad.* ...	medio exacte cylindrica, supra tectiformis.	suboblique striatula.	cærulescenti-albida, apice flavescente.	angulato-subcircularis.	minute perforatus.	12–13	15	5½ ?	5½ ?	3⅓	3⅓	Central & S. Central Mexico.
——, var. appressa, *v. Mart.*	,,	?	,,	non soluta.	,,	12	11	?	4	2½	2½	Central Mexico.
claviformis, *v. Mart.*	clavato-cylindrica, supra tectiformis.	levissime oblique striatula.	albida, apice flavido.	quadrato-circularis.	perforato-rimatus.	17–19	16–19	5–6	4–5	3	3	S.W. Mexico.
microstoma, *Pfr.*	subclavato-cylindrica, supra subtectiformis.	lævigata.	cretaceo-alba.	parva, subtrigona.	subperforatus.	18	15½	6½	5	2⅔	3½	? Mexico.
pilocerei, *Pfr.*	cylindrico - fusiformis, supra gracilior.	striis longitudinalibus magis minusve distinctis.	corneo - albida, nitens.	triangulari-subcordata.	rimato-subperforatus.	12–13	13–14	4	4	3	3	Central Mexico.
cretacea, *Pfr.*	fusiformis, basi compresso-carinata.	lævigata, anfr. penult. semiplicatus, ult. costatus.	sordide cretaceo-alba.	oblique trigono-piriformis.	rimatus.	13–14	24	6½–7	5½	5½	5⅔	Mexico.
coahuilensis, *Binn.*	fusiformi - cylindracea, apice conica.	medio lævis, anfr. ult. 2 costati.	alba.	subquadrato-oblonga.	,,	12	29	7	6?	7?	6?	N.E. Mexico.

——, var. semisculpta, *Stearns.*	,,	medio lævis, anfr. ult. 3 costati.	purpurascenti-alba.	subcircularis.	,,	14–15	22–23½	6	5½	5½	5½	N.E. Mexico.
remondi, *Gabb*	cylindrico-subfusiformis.	obsolete costulato-striata.	flavescenti-albida.	rotundata.	perforato-rimatus.	11–12	9–10½	3½	3½	2	2	N.W. Mexico.
teres, *Menke*	cylindracea, apice gracilior.	sublævigata, anfr. ult. costulatus.	alba.	piriformi-rotundata.	breviter rimatus.	14	22	5½	5½	4	4½	Central Mexico.
——, var. minor, *Fisch. & Cr.*	,,	,,	,,	,,	,,	12	12	4	3⅔	3½	3	Central Mexico.
——, var. högeana, *v. Mart.*	,,	,,	,,	subrotundata, extus angulata.	,,	15	17	4½	4⅓	3½	3½	E. Mexico.
pfeifferi, *Menke*.....	oblongo-turrita, supra gracilior.	dense tenuiter lamelloso-costata.	flavescenti-albida, pellucida.	quadrato-rotundata, extus subangulata.	rimatus.	12 convexiusculi.	17½	5½	5	4	4½	Central Mexico.
——, var. minor, *Fisch. & Cr.*	cylindraceo-oblonga.	,,	flavescenti-albida.	rotundata.	,,	12½ convexi.	13	4	4	3	3	N.W. Mexico.
——, var. minima, *v. Mart.*	subconico-turrita.	,,	carnea, costis albis.	,,	perforatus.	11 convexi.	11½	4	3½	2½	2½	Mexico.
goniostoma, *Pfr.*	cylindrico-turrita, gracilis.	subconferte arcuato-costata.	fuscescens, costis albis.	oblique ovalis, extus angulata.	rimatus.	15	12–15½	3	3	2⅔	2½	? Central Mexico.
fusca, *v. Mart.*	fusiformi-cylindrica.	levissime striatula.	lilaceo-fusca.	subcircularis.	latiusculus.	19	12–16	3⅕–5	3–4	2½–3½	2½–3½	S.W. Mexico.
berendti, *Pfr.*	cylindrico-turrita.	costulis confertissimis subinde intermissis.	violascenti-brunnea.	subangulato-rotundata.	rimatus.	14	12½	3	?	2½	...	E. Mexico.
——, var. albida, *Fisch. & Cr.*	,,	,,	albida.	,,	,,	14?	12	3	?	2	...	S.E. Mexico.

shell, the greatest diameter being in the tenth whorl (at about one-third of the whole length, as seen from above), the following whorls diminishing remarkably in diameter, and the under-edge of some of them projecting a little over the following whorl. Fischer and Crosse's figure of *H. gealei* (op. cit. t. 17. fig. 7) resembles it somewhat in outline, but is not so strikingly swollen above and wants the vertical costæ. I give here a copy of the original figure published by me in 1865 [1].

2. Holospira tryoni.

Cylindrella tryoni, Pfr. in Journ. de Conch. xv. p. 438 (1867) [1]; Monogr. Helic. Vivent. vi. p. 390 [2]; Novitat. Conch. iii. p. 433, t. 97. figg. 5–7 [3].

Holospira tryoni, Crosse & Fisch. Journ. de Conch. xviii. pp. 14, 24, t. 5. fig. 5 (jaw) (1870) [4].

Bostrichocentrum tryoni, Strebel, Beitr. Mex. Land- und Süssw.-Conch. iv. p. 81, t. 5. fig. 3 (second figure), t. 14. figg. 13 (columellar axis), 16 A, B (aperture) [5].

Holospira gealei (H. Ad.), Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 333, t. 17. figg. 7, 7 *a*, *b*, and t. 16. fig. 5 (jaw) [6].

Hab. Central Mexico: Matamoros Izucar, in the State of Puebla, on a species of cactus (*Boucard* [5]); Puebla [1–4].

Var. *gealei*.

Cylindrella (*Holospira*) *gealei*, H. Adams, P. Z. S. 1872, p. 13, t. 3. fig. 19 [7]; Pfr. Monogr. Helic. Vivent. viii. p. 447 [8].

Holospira tryoni, Fisch. & Crosse, loc. cit. p. 331, t. 17. figg. 6, 6 *a–c* [9].

Bostrichocentrum tryoni, Strebel, loc. cit. t. 5. fig. 3 (first figure) [10].

Hab. Central Mexico: State of Puebla, from a dealer [10]; ? Matamoros Izucar [9].

S. Central Mexico: Putla, in the State of Oaxaca [7 8].

Var. *appressa*, n.

Holospira tryoni, var. *β*, Fisch. & Crosse, loc. cit. p. 331 [11].

Hab. Central Mexico: Matamoros Izucar [11].

The two varieties are probably nothing more than individual variations.

H. tryoni and *H. gealei*, according to the original figures given by Pfeiffer and H. Adams, appear to differ chiefly in the shape of the shell—broadly ovate for *H. tryoni*, and longer and exactly cylindrical in the middle in *H. gealei*. But the proportion of the diameter to the length of the shell in the figures does not in either case accord with the measurements given by the author. Pfeiffer, for *H. tryoni*, gives length $13\frac{1}{2}$ millim. and diameter $4\frac{1}{2}$ millim., the diameter, therefore, being one-third of the length; but the largest diameter, as well as that of the penultimate whorl, is considerably more than one-third the length. In H. Adams's figure of *H. gealei* the diameter, if reduced to natural size, is a little less than five, not $5\frac{1}{2}$ times the length, as stated in the description. Either his figured specimen was not the same as that

from which the measurements were taken, or one of them is very inexact. Fischer and Crosse, on the contrary, figure under the name *H. gealei* (fig. 7) a broadly ovate shell, resembling Pfeiffer's *H. tryoni*, and for *H. tryoni* a cylindrical one, resembling H. Adams's *H. gealei*. I should suppose that the figures had been exchanged by inadvertence, but in the text also *H. gealei* is said to be "proportionellement plus courte et plus renflée que la plupart de ses congénères." An explanation of these difficulties may be found in Strebel's work, he giving the exact measurements of nine full-grown specimens, showing that the proportion of the diameter to the length of the shell varies from 1 : 3 to 1 : 2, the proportion of the aperture to the whole length about 1 : $3\frac{2}{3}$ to 1 : $4\frac{1}{3}$, and the number of whorls from $11\frac{1}{2}$ to $15\frac{1}{4}$. The absolutely longer specimens are comparatively narrower, *i. e.* they are less involute, but the difference in cubital measurement is not so great as seems at first sight. Probably these are only individual variations and not even local varieties, as also Fischer and Crosse's var. β (*appressa*); but, for the present, I prefer to give in the Comparative Table of the species the characters according to the original descriptions and figures.

As regards the sculpture, the original figures given by H. Adams and Pfeiffer do not show such a difference as would be supposed from Adams describing it as "oblique striata" and Pfeiffer "subtilissime striatula"; moreover, Fischer and Crosse do not attach importance to it. Adams's definition "anfr. supernis subangulatis" leads me to suppose that in some individuals the edge of the preceding whorls may project over the following ones, as in *H. imbricata*.

The genus *Bostrichocentrum* was founded by Strebel on the fact that the spiral lamella was wanting within the second and third whorls before the last; but he himself states that this is also sometimes rudimentary in the species of *Holospira* (loc. cit. p. 82).

3. **Holospira claviformis,** sp. n. (Tab. XVI. figg. 10–16.)

Cylindrella piloceri, Sowerby, in Reeve's Conch. Icon. xx., *Cylindrella,* t. 6. fig. 48 (nec Pfr.) [1].

Testa clavato-cylindrica, arctispira, peranguste perforata, solida, levissime oblique striatula, albida; anfr. 17–19, primi 2 flavidi, læves, subglobosi, apice papillari, sequentes 5–6 celerius crescentes conulum humilem spiræ formantes, ulteriores 12–13 diametro subæquales vel paulatim decrescentes testam clavato-cylindricam constituentes, sutura leviter impressa, ultimus humilis, costulis verticalibus subirregularibus sculptus, infra rotundatus, non ascendens, antice breviter protractus, hic supra complanatus et obtuse angulatus; apertura subverticalis, quadrato-circularis, peristomate undique breviter expanso, albo.

a. Long. $19\frac{1}{2}$, diam. anfr. penult. 4, diam. max. $5\frac{1}{2}$, apert. long. 3, lat. 3 millim.
b. „ 19, „ „ 5, „ 6, „ 3, „ 3 „
c. „ 19, „ „ $4\frac{1}{2}$, „ 5, „ 3, „ 3 „
d. „ 18, „ „ $4\frac{1}{2}$, „ 6, „ 3, „ 3
e. „ 17, „ „ $4\frac{1}{2}$, „ $5\frac{1}{2}$, „ 3, , 3
f. „ 16, „ „ $4\frac{1}{2}$, „ 5, „ 3, „ 3 „
g. „ 16, „ „ 5, „ 6.

Hab. S.W. Mexico: Amula near Tixtla, in the State of Guerrero (*H. H. Smith*).

A large number of individuals, showing a considerable range of individual variation,

from the slender cylindrical form *c* to the more distinct claviform, with the largest diameter near the upper end, *e* (fig. 13), and the more abbreviate and bulky pupiform, *g* (fig. 15). The sculpture, colour, form, and size of the aperture are similar in all the specimens received. The apical cone formed by the 6–7 terminal whorls varies somewhat in its elevation, but is always well distinct from the cylindrical main part of the shell. The opening of the umbilicus is also variable in size, see figg. 10 and 15. For the young state, see fig. 16.

This species somewhat resembles *H. gealei*, H. Adams, in shape, one or two individuals agreeing even tolerably well with the author's figure of it; but the whorls are considerably higher comparatively in *H. gealei* than they are in *H. claviformis*. The main part of the shell is formed by 8 whorls in *H. gealei* and by 12 in *H. claviformis*; the total number of whorls in *H. gealei* is 12–13, in *H. claviformis* 17–19. The aperture is also comparatively larger and the costulation of the last whorl in *H. claviformis* is not mentioned in the description of *H. gealei*. *H. pilocerei*, var. β, Fisch. & Crosse, Miss. Scient. Mex., Mollusca, p. 329, t. 12. figg. 5, 5 *a*, *b*, from "Mexico," without nearer indication of locality, perhaps belongs to the same species; but in the figure the upper part of the shell appears to be less tectiform.

4. **Holospira microstoma.**

Cylindrella microstoma, Pfr. P. Z. S. 1861, p. 27 [1]; Monogr. Helic. Vivent. vi. p. 390 [2].

Holospira microstoma, Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 337, t. 17. figg. 9, 9 *a* [3].

Hab. ? MEXICO [3].

Near *H. claviformis*, but apparently distinct by the triangular aperture and the keel on the base of the last whorl; the upper part of the shell is also less regularly tectiform (*H. claviformis* in this respect being more like the following species), and the apex is not so papillary and prominent.

5. **Holospira pilocerei.**

Cylindrella pilocerei, Pfr. Symbolæ Hist. Helic. i. p. 47 (1841) [1]; Philippi, in Abbild. neuer Conch. i. p. 183, *Cylindrella*, t. 1. fig. 7 [2], and iii. p. 5, *Cylindrella*, t. 3. figg. 7, 8 [3]; Monogr. Helic. Vivent. ii. p. 382 [4]; and Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, *Cylindrella*, p. 61, t. 6. figg. 32, 33 [5].

Holospira pilocerei, Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 329 [6]; Strebel, Beitr. Mex. Land- und Süssw.-Conch. iv. p. 82, t. 5. fig. 1 [7].

Hab. CENTRAL MEXICO: Cuautla de las Amilpas, in the State of Puebla *, on the cactoid plant *Pilocereus senilis* (*Hegewisch* [1–7]); Mexico, without nearer indication of locality (*Liebmann* [2–7]).

* The locality is probably in the State of Morelos, and not in Puebla as stated.

6. **Holospira cretacea.**

Cylindrella cretacea, Pfr. P. Z. S. 1860, p. 140 [1]; Monogr. Helic. Vivent. vi. p. 389 [2].
Holospira cretacea, Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 335, t. 17. figg. 8, 8 *a* [3].

Hab. Mexico, without nearer indication of locality (*Cuming* [1–3]).

Very near the following.

7. **Holospira coahuilensis.**

Cylindrella coahuilensis, Binney, Am. Journ. of Conch. i. p. 50, t. 7. figg. 4, 5 (1865) [1]; Pfr. Monogr. Helic. Vivent. viii. p. 445 [2].
Gongylostoma coahuilensis, Tryon, Am. Journ. of Conch. iii. p. 312, t. 15. fig. 29 [3].
Holospira coahuilensis, Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 334 [4].

Whorls 12, the last two strongly costate: length 29, diameter 7 millim.

Hab. N.E. Mexico: Cienega grande, in the State of Coahuila [1–4].

Var. *semisculpta*.

Holospira semisculpta, Stearns, Proc. U. S. Nat. Mus. xiii. p. 208, t. 15. figg. 1 & 4 (1890) [5].

Whorls 14–15, the last three or three and a half strongly ribbed: length 22–23½, diameter 5½–6 millim.

Hab. N.E. Mexico: in a cañon above San Carlos, in the State of Chihuahua (*T. W. Stanton* [5]).

8. **Holospira remondi.**

Cylindrella remondi, Gabb, Am. Journ. of Conch. i. p. 208, t. 19. figg. 10–13 (1865) [1]; Pfr. Monogr. Helic. Vivent. vi. p. 389 [2].
Holospira remondi, Tryon, Am. Journ. of Conch. iii. p. 313, t. 15. fig. 32 [3]; Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 325, t. 17. figg. 2, 2 *a–c* [4].

Hab. N.W. Mexico: Arivechi, valley of Sahuaripa, in the State of Sonora (*Rémond* [1–4]).

Also somewhat variable in form, according to the two published figures.

9. **Holospira teres.**

Cylindrella teres, Menke, Zeitschr. für Malak. iv. p. 1 (1847) [1]; Philippi, Abbild. neuer Conch. iii. p. 5, t. 3. figg. 5, 6 [2]; Pfr. Monogr. Helic. Vivent. ii. p. 381 [3]; Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, *Cylindrella*, p. 59, t. 6. figg. 28, 29 [4].
Holospira teres, Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 327 [5].

Hab. Central Mexico: State of Puebla (*Liebmann* [1–5]).

Var. *minor*.

Holospira teres, var. *β*, Fisch. & Crosse, loc. cit. p. 327, t. 17. figg. 3, 3 *a*, *b* [6].

Hab. Central Mexico: State of Puebla (*Liebmann* [6]).

Var. *högeana*. (Tab. XVI. fig. 17.)

Aperture with a distinct angle outwards and above, as in *H. goniostoma*; size, sculpture, and colour as in *H. teres*.

Hab. E. Mexico: Maltrata, on the railway between Vera Cruz and the city of Mexico, a little west of Orizaba, eastern slope of the plateau (*Höge*).

10. Holospira pfeifferi.

Cylindrella pfeifferi, Menke, Zeitschr. für Malak. iv. p. 1 (1847) [1]; Philippi, Abbild. neuer Conch. iii. p. 6, t. 3. fig. 4 [2]; Pfr. Monogr. Helic. Vivent. ii. p. 382 [3]; Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, *Cylindrella*, p. 60, t. 6. figg. 30, 31 [4].

Holospira pfeifferi, Tryon, Am. Journ. of Conch. iii. p. 313, t. 15. fig. 34 [5]; Crosse & Fisch. Journ. de Conch. xviii. p. 13, t. 5. figg. 6–10 (jaw and radula) (1870) [6]; Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 323, t. 16. figg. 6–10 (jaw and radula) [7]; Strebel, Beitr. Mex. Land- und Süssw.-Conch. iv. p. 84, t. 13. fig. 12 [8].

Hab. Central Mexico: Tehuacan, in the State of Puebla (*Liebmann* [1–4 6–8]).

Var. *minor*.

Holospira pfeifferi, var. *β*, Fisch. & Crosse, loc. cit. p. 324, t. 17. figg. 1, 1 *a–c* [9].

Hab. N.W. Mexico: Cerro de la Campana, near Hermosillo, in the State of Sonora (*Rémond* [9]).

Var. *minima*, n. (Tab. XVI. fig. 18.)

Length 11½ millim. only, 4 in the largest diameter; aperture 2½ millim.; whorls 11, distinctly convex; colour reddish-yellow, the costæ white.

Hab. Mexico: without nearer indication of locality (*coll. Pätel*).

The figure and dimensions given by Tryon [5] agree with the typical *H. pfeifferi* from Tehuacan, but not with the specimens from Sonora: either he has not taken both from Sonoran examples, or what Fischer and Crosse regard as a local form is only an individual variation. In *H. claviformis* and others a similar individual variation is to be found amongst specimens from the same locality.

11. Holospira goniostoma.

Cylindrella goniostoma, Pfr. Malak. Blätt. iii. p. 47 (1856) [1]; Monogr. Helic. Vivent. iv. p. 710 [2]; and in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, *Cylindrella*, p. 63, t. 7. figg. 7–9 [3]; v. Mart. Malak. Blätt. xii. p. 15 (1865) [4].

Holospira goniostoma, Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 328, t. 17. figg. 4, 4 *a, b* [5]; Strebel, Beitr. Mex. Land- und Süssw.-Conch. iv. p. 84, t. 14. figg. 6 A, B, C (columellar axis) [6].

Hab. Mexico: without nearer indication of locality (*Cuming* [1 3 4 6]; *Uhde* [4 5]).

Uhde's specimen is very much shorter (length 12 millim.) than that of Cuming length 15–15½ millim.), and it has only 14 instead of 15–16 whorls; but in the

diameter of the whole shell and in the size of the aperture they are alike. All are probably from Central Mexico.

The figure in Reeve's 'Conchologia Iconica,' *Cylindrella*, t. 8. fig. 72, does not agree with my specimens nor with the original figure [3]; it shows much more oblique costæ and a more protracted aperture.

12. **Holospira fusca,** sp. n. (Tab. XVI. figg. 19–24.)

Testa latiuscule umbilicata, fusiformi-cylindrica, arctispira, tenuis, levissime oblique striatula, lilaceo-fusca; anfr. 19, primi duo subglobosi, læves, pallide cornei (rarius nigrescentes), sequentes 7 paulo celerius crescentes conulum elevatum formantes, ulteriores paululum decrescentes, convexiusculi, sutura modice impressa, ultimus basi inflate rotundatus, antice subascendens, brevissime productus; apertura verticalis, subcircularis, persistomate undique crassiusculo, breviter expanso, albo, margine supero transverso, angulo externo distincto, marginibus ceteris arcuatis.

Long. 16, diam. anfr. penult. 4, diam. max. 5, apert. long. $3\frac{1}{2}$, lat. $3\frac{1}{2}$ millim.
„ $14\frac{1}{2}$, „ „ 3, „ $3\frac{1}{3}$, „ $2\frac{1}{2}$, „ $2\frac{1}{2}$ „
„ 12, „ „ $3\frac{1}{2}$, „ $3\frac{2}{3}$, „ $2\frac{1}{2}$, „ $2\frac{1}{2}$ „
„ 12, „ „ 3, „ $3\frac{1}{2}$, „ $2\frac{1}{2}$, „ $2\frac{1}{2}$ „

Hab. S.W. Mexico: Omilteme, in the State of Guerrero (*H. H. Smith*).

Somewhat similar to *H. goniostoma*, but differing from it in the form of the umbilicus, the want of costulæ, and also in the number of whorls. The general form of the shell, as well as the width of the umbilicus, is somewhat variable, as may be seen from our figures 19–23; for the young state, see fig. 24.

This and the following species are the only dark-coloured forms belonging to *Holospira*, s. str.

13. **Holospira berendti.**

Cylindrella berendti, Pfr. Malak. Blätt. xiii. p. 87 (1866) [1]; Monogr. Helic. Vivent. vi. p. 387 [2]; Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 409 [3].

Epirobia berendti, Strebel, Beitr. Mex. Land- und Süssw.-Conch. iv. p. 86, t. 13. fig. 1 (radula), and t. 14. fig. 18 (columellar axis) [4].

Hab. E. Mexico: Toxpan *, on the slope of the mountain Matlaquiahuitl, near Cordova, in the State of Vera Cruz (*Berendt* [1 3]).

Var. *albida.*

Cylindrella berendti, var. *β. albida,* Fisch. & Crosse, loc. cit. p. 409 [5].

Epirobia berendti, Strebel, loc. cit. p. 86, t. 3. fig. 7 [6].

Hab. S.E. Mexico: Chiapas (*Bland* [5], *Berendt* [6]).

The radula of this species agrees very nearly with that of *H. pfeifferi*, figured by Fischer and Crosse, but the vertical sculpture of the columellar axis is as in the subgenus *Epirobia*; the species therefore is intermediate between the two divisions.

* Sometimes written Tuxpan.

Comparative Table of the Species of the Subgenus *Epirobia*.

Nomen.	Sculptura.	Coloratio.	Anfr. ult.	Apertura.	Anfr.	Long.	Diam.	Apert.	Patria.
gassiesi, *Pfr.*	subtilissime confertissime filo-striata.	albido-cornea.	breviter productus, basi rotundatus.	subquadrato-circularis.	17	mm. 14	mm. 3	mm. $2\frac{1}{2}$	S.E. Mexico.
apiostoma, *Pfr.*	subarcuato-striatula.	albido-cornea, nitidula.	deorsum productus, teres.	subquadrata vel transverse piriformis.	22–24	17–18	$2\frac{1}{3}$	2	E. Mexico.
subtilis, *Morel.*	striis subdistantibus vix elevatis.	pallide cornea.	deorsum productus, basi carinatus.	oblique piriformis.	23	12–14	$2\frac{1}{2}$	2	N. Guatemala.
swiftiana, *Crosse*	costulis minutis confertissimis intermittentibus.	castaneo-cornea, costulis albis.	transverse breviter productus, teres.	subquadrato-circularis.	21	18	$2\frac{1}{2}$	2	? Mexico.
speluncæ, *Pfr.*	distanter lamellosocostulata.	corneo-flavescens.	deorsum breviter productus, basi carinatus.	subangulose circularis.	22	16	3	2	N. Guatemala.
polygyra, *Pfr.*	confertim arcuatocostulata.	carneo-grisea.	transverse breviter productus, teres.	quadrato-circularis.	24–27	18	$2\frac{1}{2}$	2	E. Mexico.
polygyrella, *v. Mart.*	,,	,,	,,	transverse piriformis.	22 arcti.	14 (17)	$2\frac{1}{2}$	$1\frac{1}{2}$	N. Guatemala.
morini, *Morel.*	oblique argute costulata.	pallide cornea, costulis pallidioribus.	deorsum productus, basi filo-carinatus.	subcircularis.	22–24 subinde decollati.	15–16	$2\frac{1}{2}$	2	S.E. Mexico and N. Guatemala.
——, var. pulchella, *v. Mart.*	oblique tenuiter costulata.	albida.	,,	transverse piriformis.	13 decollati.	$10\frac{1}{2}$	$2\frac{1}{2}$	$1\frac{1}{2}$–2	E. Guatemala.
——, var. salpinx, *Tristr.*	oblique argute costulata, varicosa.	grisea, varicibus albis.	,,	,,	16 decollati.	$14\frac{1}{2}$	$2\frac{1}{2}$	2	N. Guatemala.
——, var. sargi, *v. Mart.*	oblique costulata.	albida.	vix productus, basi filo-carinatus.	(subappressa).	15 decollati.	$12\frac{1}{2}$	$2\frac{1}{2}$	...	N. Guatemala.

Subgen. Epirobia, Strebel.

Cylindrella, subgen. *Holospira* (part.), v. Martens, in Albers's Die Heliceen, ed. 2, pp. 39, 40 (1860).

Cylindrella, sect. 1, species integræ, and sect. 2, species subtruncatæ, Fischer & Crosse, Miss. Scient. Mex., Mollusca, i. pp. 318, 401, 404, 413.

Epirobia, Strebel, Beitr. Mex. Land- und Süssw.-Conch. iv. p. 84 (1880) (mainland species only).

Shell slenderly turrite, with 17–24 whorls, the first two swollen, smooth, forming a fine papillary tip, sometimes lost in the adult shell, the following whorls gradually increasing in diameter, almost always preserved in the adult shell, convex, with rather deep suture, and perpendicularly costulated or striated; columellar axis narrowly hollowed, with longitudinal, elevated, opaque white striæ (Strebel, *loc. cit.* t. 14. figg. 14, 15, 18); last whorl more or less produced near the aperture, which is round or transversely pear-shaped, the pointed end outwards, and provided with a thick somewhat reflexed peristome. Size small, 10–18 millim. in length and 2–3 millim. in diameter. Colour generally dull grey; seldom bi-coloured. Median tooth of the radula large and very blunt, without lateral points; first lateral tooth equal in size to the median, but asymmetrical, with a small outer point; the following teeth decreasing in size, but with the outer point becoming gradually stronger (Strebel, *loc. ci* t. 13. figg. 1, 2, 4, 5).

Geographical distribution extending from Eastern Mexico to Guatemala, also in Venezuela, but not yet known from Costa Rica or Panama or from the West-Indian Islands.

The Mexican and Guatemalan species left by Fischer and Crosse in the large genus *Cylindrella*, after the separation of *Eucalodium*, *Cœlocentrum*, and *Holospira*, form a peculiar group, distinct from the insular forms chiefly in the preservation of all, or nearly all, the whorls in the adult state. The said authors had no opportunity of examining the radula of any of them, but the researches of Strebel prove that it is much more like that of *Holospira* than that of the species of *Cylindrella* proper. The columellar axis, too, is similar in form in *Epirobia* and *Holospira*. I therefore once more unite them into one systematic division.

14. **Holospira gassiesi.**

Cylindrella gassiesi, Pfr. Journ. de Conch. xv. p. 438 (1867) [1]; Monogr. Helic. Vivent. vi. p. 376 [2]; Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 410, t. 17. figg. 17, 17 *a*, *b* [3].

Hab. S.E. Mexico: Chiapas (*Bland* [1–3]).

15. **Holospira apiostoma.**

Cylindrella apiostoma, Pfr. P. Z. S. 1856, p. 322, t. 35. figg. 2, 3 [1]; in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, *Cylindrella*, p. 32, t. 8. figg. 3–5 [2]; Monogr. Helic. Vivent. iv. p. 703 [3]; Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 406, t. 17. figg. 15, 15 *a*, *b* [4]; Sowerby, in Reeve's Conch. Icon. xx., *Cylindrella*, t. 15. fig. 129 [5]; Strebel, Beitr. Mex. Land- und Süssw.-Conch. iv. p. 88, t. 5. fig. 6, t. 13. fig. 11 (genitalia) [6].

Hab. E. Mexico: Cordova (*Sallé* [1–6]); Cordova, at the entrance of the cave of Cacahuatl (*Höge*).

Columellar axis beset with fine spinules.

16. **Holospira subtilis.**

Cylindrella subtilis, Morelet, Test. Noviss. i. p. 11 (1849) [1]; Pfr. Monogr. Helic. Vivent. iii. p. 577 [2]; Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, *Cylindrella*, p. 56, t. 5. figg. 33–35 [3]; Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 413, t. 17. figg. 13, 13 *a*, *b* [4]; Sowerby, in Reeve's Conch. Icon. xx., *Cylindrella*, t. 14. fig. 125 [5].

Hab. N. Guatemala: forests of Peten (*Morelet* [1–5]).

17. **Holospira swiftiana.**

Cylindrella swiftiana, Crosse, Journ. de Conch. xi. p. 388 (1863) [1], and xv. p. 200, t. 5. fig. 5 [2]; Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 407, t. 17. figg. 14, 14 *a*, *b* [3]; Pfr. Monogr. Helic. Vivent. vi. p. 370 [4].

Hab. ? Mexico [1–4].

18. **Holospira speluncæ.**

Cylindrella costulata, Morelet, Test. Noviss. ii. p. 12 (1851) [1] (nec C. B. Adams, 1849).

Cylindrella speluncæ, Pfr. Zeitschr. für Malak. ix. p. 151 (1852) [2]; Monogr. Helic. Vivent. iii. p. 577 [3]; Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 410, t. 17. figg. 11, 11 *a*, *b* [4].

Hab. N. Guatemala: on the walls of the cave Jobitsinal, near the capital of Peten (*Morelet* [1–4]).

19. **Holospira polygyra.**

Cylindrella polygyra, Pfr. P. Z. S. 1856, p. 322, t. 35. figg. 2, 3 [1]; in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, *Cylindrella*, p. 31, t. 8. figg. 6–8 [2]; Monogr. Helic. Vivent. iv. p. 604 [3]; Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 405, t. 17. figg. 16, 16 *a–c* [4]; Sowerby, in Reeve's Conch. Icon. xx., *Cylindrella*, t. 7. fig. 5 (somewhat magnified) [5].

Epirobia polygyra, Strebel, Beitr. Mex. Land- und Süssw.-Conch. iv. p. 87, t. 5. figg. 7 *a*, *b*, t. 13. fig. 2 (radula), t. 14. fig. 14 (columellar axis) [6].

Hab. E. Mexico: Cordova (*Sallé* [1–6]).

The columellar axis is particularly swollen in the lower part within each whorl, and here rather granulose, in the upper part vertically costate (*Fischer & Crosse* [4], *Strebel* [6]).

20. **Holospira polygyrella.** (Tab. XVII. figg. 1, 1 *a*, *b*.)

Cylindrella polygyra, v. Mart. P. Z. S. 1863, p. 411 [1].

Cylindrella polygyrella, v. Mart. Jahrb. d. malak. Ges. iii. p. 261, t. 9. fig. 8 (1876) [2]; Pfr. Monogr. Helic. Vivent. viii. p. 622 [3].

Cylindrella morini, Strebel, Beitr. Mex. Land- und Süssw.-Conch. iv. p. 87, t. 5. fig. 3, t. 13. fig. 4 (radula), t. 14. figg. 15 A, B, C [4] (nec Morelet).

Hab. N. Guatemala: Coban, Vera Paz, copiously (*Salvin* [1–3]; *Sarg*; *coll. Dunker* [4]; *Conradt, in Mus. Berol.*).

Distinct from the preceding by its smaller size (length 14, in one specimen

17 millim.), the more convex and broader whorls (the visible part of the lower whorls $2\frac{1}{2}$ times as broad as high, instead of $1\frac{1}{2}$–$1\frac{2}{3}$ times, as in *H. polygyra*), and the distinctly transverse pear-shaped or triangular aperture.

The columellar axis is longitudinally costate, the costæ being partly divergent and partly forked above; the lower half within each whorl is not particularly swollen (see fig. 1).

21. **Holospira morini.**

Cylindrella morini, Morelet, Test. Noviss. i. p. 11 (1849)[1]; Pfr. Monogr. Helic. Vivent. iii. p. 578[2]; Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, *Cylindrella*, p. 48, t. 5. figg. 24–26[3]; Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 412, t. 17. figg. 12, 12 *a*, *b*[4]; Sowerby, in Reeve's Conch. Icon. xx., *Cylindrella*, t. 16. fig. 136 (somewhat magnified)[5]; Pilsbry, Proc. Acad. Phil. 1892, p. 338[6].

Hab. S.E. Mexico: mountains of Poana, in the State of Tabasco (*Rovirosa*[6]).

N. Guatemala: Vera Paz, in rocky places in the forest (*Morelet*[1–4]); Cahabon (*Sarg*[4]).

Var. *pulchella*.

Cylindrella (*Gongylostoma*) *pulchella*, v. Mart. Sitzungsb. d. Ges. nat. Freunde Berlin, 1886, p. 161[7].

Of smaller size, $10\frac{1}{2}$ millim. only in length; last whorl much produced, with strong keel; aperture $1\frac{1}{2}$ millim. long, 2 millim. broad.

Hab. E. Guatemala: Livingston, in the Bay of Honduras, on the lower surface of stones (*O. Stoll*[7]).

Var. *salpinx*.

Cylindrella salpinx, Tristram, P. Z. S. 1861, p. 231[8]; Pfr. Monogr. Helic. Vivent. vi. p. 391[9]; Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 415[10].

Hab. N. Guatemala: probably near Coban or Lanquin, in Vera Paz * (*Salvin*[8–10]).

I have examined the two typical specimens obtained by Mr. Salvin in Guatemala. One of these agrees very well with *C. morini*, only differing from it in having a pure white varix on the fifth and sixth whorls before the last, one just above the other, and a less distinct varix on the following whorl, immediately below the others; its general colour is a dull ashy-grey. The second specimen is pure white, probably bleached.

Var. *sargi*.

Cylindrella morini, var. β, Fisch. & Crosse, loc. cit. pp. 412, 413[11].

Whitish, the aperture scarcely produced, nearly appressed to the penultimate whorl.

Hab. N. Guatemala: Cahabon (*Sarg*[11]).

* The locality is incorrectly given as Dueñas by Fischer and Crosse[10].

CYLINDRELLA.

Les Trachéloides, Férussac, Tab. Syst. Anim. Moll., Prodr. gén. p. 61 (1821–22).

Brachypus, Lansdown Guilding, Zool. Journ. iv. p. 167 (1828) [nec Meyer, 1815 (Aves), Meigen, 1824 (Ins.)].

Pupa, subgen. *Urocoptis* et *Brachypodella, Clausilia,* subgen. *Apoma,* Beck, Index Moll. pp. 83, 89 (1837).

Siphonostoma, Swainson, Treatise on Malacology, p. 333 (1840) [nec Zenk., 1832 (Rot.), Voigt, 1836 (Vermes)].

Cylindrella, Pfeiffer, Archiv f. Naturg. vi. 1, p. 38 (1840); Monogr. Helic. Vivent. i. Introd. p. xxiii, and ii. p. 368 &c. (part.).

Cylindrella, subgen. *Thaumasia* (part.), *Mychostoma, Gongylostoma,* and *Casta,* Albers, Die Heliceen, ed. 1, pp. 207, 208 (1850).

Cylindrella, subgen. *Urocoptis* (part.), *Mychostoma, Gongylostoma, Trachelia,* and *Casta,* Albers, Die Heliceen, ed. 2, pp. 36–42 (1860).

Cylindrella, P. Fischer, Manuel de Conch. p. 476 (1887).

Shell cylindrical, turrite, composed of many whorls, a large number of which are lost in the adult state, leaving a decollate, non-perforated upper end. Aperture protracted beyond the suture, circular or subquadrate, with continuous reflected peristome. Jaw very thin, striolate. Median tooth of the radula very small and narrow, not quite in a line with the laterals, these latter of a peculiar pickaxe-like form. [Crosse, Journ. de Conch. xviii. p. 17, t. 3. figg. 6–13, and t. 4. figg. 1–6 (1870); Binney, Ann. N. Y. Acad. iii. p. 125, t. 14. figg. A, B (1884); Strebel, Beitr. Mex. Land- und Süssw.-Conch. iv. t. 13. figg. 6, 7, 8.]

Characteristic of the West-Indian Islands—one species only falling within the limits of this work, this having been found on an island in the Caribbean Sea.

1. Cylindrella bourguignatiana.

Cylindrella bourguignatiana, Ancey, Ann. de Malac. ii. p. 243 (1886) [1].

Cylindrical, subfusiform, pale horn-coloured, with oblique, sharp, rib-like lamellæ, decollated; remaining whorls 9 to 10, the last a little narrower than the preceding, near the aperture produced into a crenulated keel, the aperture irregularly circular. Length of the decollate shell $11\frac{1}{2}$ millim., diameter 2, aperture 9 millim.

Hab. Honduras: Utila Island (*Simpson* [1]).

Unknown to me. According to the author, the species does not belong to the Mexican and Guatemalan group of *Cylindrellæ,* but is strongly decollate, approaching *C. pallida,* Lansd. Guild., from St. Thomas. That species, however, in its general appearance, is not very distant from some of the *Epirobiæ.*

MACROCERAMUS.

Macroceramus, Lansdown Guilding, Zool. Journ. iv. p. 168 (1828).

Shell longitudinal, conically or regularly turrite, with many (9–19) gradually increasing whorls, all of them remaining in the adult state, the last usually angulate at the base; aperture comparatively small, not produced beyond the suture; peristome not continuous, but interrupted by the penultimate whorl, shortly reflexed. Jaw very thin, costate, the costæ converging and meeting in an acute angle in the middle. Radula with oblique rows of teeth, the median tooth smaller than those next it, rather blunt; lateral teeth with one, the marginals with two little points on the outer side. [Bland, Ann. Lyc. N. York, viii. p. 162, fig. 6 (1867); Crosse, Journ. de Conch. xviii. t. 3. figg. 14–16 (1870); Binney, Proc. Acad. Phil. 1875, pp. 223, 251, t. 15. fig. 1 and t. 20. fig. 9.]

This genus is chiefly confined to the West-Indian Islands; a few species, however, closely resembling the West-Indian forms, are found on the mainland of Florida, Mexico, Guatemala, and Honduras.

1. **Macroceramus concisus.**

Cylindrella concisa, Morelet, Test. Noviss. i. p. 12 (1849) [1], and ii. p. 27 (1851) [2]; Deshayes, in Férussac's Hist. Nat. Moll. Terr. ii. p. 224, t. 164. figg. 23–25 [3].

Macroceramus concisus, Petit, Journ. de Conch. i. p. 379 (1850) [4]; Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 421, t. 18. figg. 1, 1 *a*, *b* [5]; Pfr. Monogr. Helic. Vivent. viii. p. 420 [6]; Strebel, Beitr. Mex. Land- und Süssw.-Conch. iv. p. 90, t. 5. fig. 4 *c* [7].

Macroceramus polystreptus, Tristram, P. Z. S. 1861, p. 233, t. 26. fig. 11 [8]; Pfr. Monogr. Helic. Vivent. vi. p. 345 [9].

Hab. Yucatan (*Morelet* [1 2 3]), Merida (*Höge*).

N. Guatemala: Peten, on rocky hills (*Morelet* [4 5]); Coban * (*Sarg* [7], *Salvin* [8 9]).

The number of costulæ in the penultimate whorl is somewhat variable—49, 50, and 54, in specimens from Guatemala and Yucatan; Strebel [7] also gives 50.

Var. *mexicanus,* n. (Tab. XVII. fig. 2.)

Macroceramus pontificus, Strebel, loc. cit. p. 89, t. 5. fig. 4 *d* (nec A. Gould) [10].

Relatively shorter and broader, length $8\frac{1}{2}$–$9\frac{1}{2}$ millim., diameter of the last whorl 3–$3\frac{1}{2}$ millim.; $9\frac{1}{2}$–$9\frac{3}{4}$ whorls only; white papillæ at the suture small, scattered, and few in number; peristome of the aperture rather thin. Number of costulæ 60 or more, according to Strebel [10]; some of them, however, are so indistinct that it is very difficult to count them.

Hab. E. Mexico: Orizaba (*Berendt, Botteri* [10], *Höge*); Atoyac (*H. H. Smith*); Arroyo grande, near Misantla (*Salas* [10]).

Central Mexico: Sayula, in the State of Jalisco, one specimen, not full-grown (*Höge*).

* The locality is incorrectly given as Dueñas by Fischer and Crosse.

Comparative Table of the Species of *Macroceramus*.

Nomen.	Sculptura.	Forma.	Coloratio.	Anfr.	Long.	Diam. anfr. penult.	Apertura.		Patria.
							Long.	Lat.	
					mm.	mm.	mm.	mm.	
concisus, *Morel.*	oblique costulato-striata, papillis suturæ sparsis.	conico-turrita, basi subcarinata.	corneo-cinerea, strigis latis albis.	$10\frac{1}{4}$–12	$9\frac{3}{4}$–11	$3\frac{1}{2}$–4	$2\frac{1}{2}$–$2\frac{4}{5}$	$2\frac{1}{2}$–$2\frac{2}{3}$	Yucatan, N. Guatemala.
——, var. mexicanus, *v. Mart.* ...	oblique costulato-striata, papillis suturæ paucis.	„	corneo-cinerea, strigis latis albis, sæpius unicolor.	$9\frac{1}{2}$–$9\frac{3}{4}$	$8\frac{1}{2}$–$9\frac{1}{3}$	3–$3\frac{2}{3}$	$2\frac{1}{2}$	$2\frac{1}{2}$	E. & Central Mexico.
kieneri, *Pfr.*	oblique confertim costata, sutura crenata, papillis nullis.	conico-turrita, obsolete carinata.	„	13	18	6	$4\frac{1}{2}$	$4\frac{1}{3}$	Honduras.
denticulatus, *Pfr.*	lineis arcuatis subprominulis undulata.	subulato - turrita, basi carinata.	pallide cornea, albo variegata.	19	23	$3\frac{2}{3}$	$3\frac{3}{4}$	$2\frac{2}{3}$	Mexico.

Another variety occurs in Texas with $10\frac{1}{2}$ whorls and few scattered papillæ, $9\frac{1}{2}$–10 millim. long, found near Dallas by Dr. Boll (Strebel, *loc. cit.* p. 90, t. 5. fig. 4 *b*).

The apex of the shell is ordinarily of a pale brownish hue in specimens from Guatemala, as well as in those from Mexico and Texas; a dark blackish colour of the apex has been observed in examples from Guatemala (*Morelet*) and from Texas (*Strebel*). *M. pontificus*, A. Gould, from Florida, seems to differ in having the papillæ numerous and regular, corresponding to each second costa and somewhat lengthened, the aperture less oblique, the peristome more circular, and the white colour prevailing on the shell. Length 11–18 millim. [Binney, Terr. Air-breath. Moll. U.S. t. 69. fig. 1; Land and Freshw. Moll. of N. Am. i. p. 220 (*kieneri*).]

2. **Macroceramus kieneri.**

Bulimus kieneri, Pfr. P. Z. S. 1846, p. 40[1]; Monogr. Helic. Vivent. ii. p. 79[2]; Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, *Bulimus*, p. 131, t. 42. figg. 23, 24[3].

Hab. Honduras (*Dyson* [1 2 3]).

Seems to differ from the preceding by the want of the white papillæ at the suture, although this is also crenated by the costulæ. Pfeiffer subsequently (Monogr. Helic. Vivent. iii. p. 365) identified it with the Floridan *M. pontificus*, A. Gould, and then separated it again from that species (*op. cit.* vi. p. 350, and viii. p. 419), adding, in the latter case, Florida as locality. In a similar manner, he gives (*op. cit.* vi. p. 350) Yucatan as a locality for *M. gossei*, Pfr., because he had at one time (*op. cit.* iii. p. 366) identified this Jamaican species with *M. concisus*.

3. **Macroceramus denticulatus.**

Cylindrella denticulata, Pfr. Monogr. Helic. Vivent. iii. p. 580[1]; Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, *Cylindrella*, p. 65, t. 7. figg. 14, 15[2]; Sowerby, in Reeve's Conch. Icon. xx. *Cylindrella*, t. 3. fig. 22[3].

Macroceramus denticulatus, Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 424[4].

Hab. Mexico (*Mus. Cuming* [1–4]).

This species does not appear to have been found by later collectors, and, as all the other forms allied to it are peculiar to the West-Indian Islands, it is doubtful if it is really Mexican.

Fam. STENOGYRIDÆ.

Generally small, unicolorous shells of oblong or turrite form. Jaw simple, slightly striated. Median tooth of the radula much smaller than the next lateral teeth.

They live chiefly on the ground, and are often carried great distances with green-house-plants or with vegetables.

Comparative Table of the Species of *Opeas*.

Nomen.	Forma.	Sculptura.	Anfractus.	Umbilicus.	Apertura.	Long.	Diam.	Aperturæ.		Patria.
								Long.	Diam.	
subula, *Pfr.*	subfusiformi-turrita.	leviter et inæqualiter striatula, cerea, subopaca.	8–9, inferiores planiusculi, sat alti, ult. 1 : 2½.	rimatus.	elongato - ovata, marg. columellari subverticali, lati usculo.	mm. 8–12 (7)	mm. 3	mm. 3-3½	mm. 2–1½	Mexico to Costa Rica.
bocourtianum, *Cr. & F.*...	conico-turrita.	sublævis, cornea.	8, planiusculi, ult. 1 : 3.	nullus.	latiuscule ovata, marg. columellari vix subdilatato.	9	2	2	1½	N. Guatemala, E. Costa Rica.
——, var. pittieri, *v. Mart.*	,,	nitida, striatula.	7, convexiusculi.	punctiformis.	,,	10	3	3½	2	Centr. Costa Rica.
guatemalense, *Streb*.....	cylindraceo - turrita, gracilis.	leviter confertim striatula, nitidula.	8½–9, lente crescentes, inf. planiusculi, ult. 1 : 3½.	rimatus.	elongato - ovata, marg. columellari tenui.	11	3	2½	1⅓	N. & W. Guatemala, S.W. Costa Rica.
——, var. majus, *v. Mart.*	,,	,,	8½–9, lente crescentes, inf. planiusculi, ult. 1 : 3⅓.	,,	ovata, marg. columellari crassiusculo, subplicato.	15	3½	3⅓	2	W. Guatemala.
colimense, *Cr. & F.*	elongato-turrita.	subtiliter impresse striata, translucida.	10, paullum convexi, ult. 1 : 3½.	obtecte subrimatus.	ovata, marg. col. tenui.	15½	3¼	3	2	E. & S.W. Mexico.
gladiolus, *Cr. & F.*	subulato-turrita.	sublævis, diaphana.	12, planiusculi, ult. 1 : 4⅓.	subobtecte rimatus.	ovata, marg. col. superne dilatato.	14⅓	2½	2	1¼	N. Guatemala.
octonoides, *C. B. Adams.*	oblongo - turrita, apice obtuso.	confertim verticaliter striata.	6–7, convexiusculi, ult. 1 : 2⅕–2½.	anguste perforatus.	oblique ovalis, marg. col. subæqualiter latiusculo.	5–6 (7)	2⅓ (2⅔)	2 (2⅓)	1¼ (1⅓)	Costa Rica, N. Panama.
micra, *Pfr.*	obese turrita, breviuscula.	distincte costulata.	7½–8½, convexi, ult. 1 : 3¼-3½.	apertus.	subrhombea, marg. col. rectilineo, crasso, breviter reflexo.	6–7½	2½–3	2	1⅓	E. & S.E. Mexico to S.W. Costa Rica.
——, var. caracasense, *Reeve.*	obese turrita.	,,	8½–9½, convexi, ult. 1 : 3½–3⅔.	,,	,,	7½–10	3–3½	2–2⅕	1½–1⅔	E. & S.E. Mexico to Panama.
? tryonianum, *Tate*	oblongo-conoidea.	confertim verticaliter striata.	7, planiusculi, sutura profunda, ult. 1 : 3.	non umbilicatus.	oblique elliptica, marg. col. crassiusculo.	5½	1⅘	?	?	N. Panama.
——, var. subovale, *v. Mart.*	ovato-subturrita.	verticaliter leviter striatula.	6, convexiusculi, ult. 1 : 2⅔.	anguste perforatus.	rhombeo - elliptica, marg. col. crassiusculo.	5½	2	2	1⅓	S.W. Costa Rica.
? semistriatum, *Morel.* ...	oblongo-conoidea.	in anfr. tertio et quarto subdistanter costulata.	7, convexiusculi, ult. 1 : 2.	distinctus, angustatus, semitectus.	ovata, marg. col. dilatato.	12	5	4½	3	S.E. Mexico.

This family nearly corresponds to the genus *Stenoyyra*, proposed by Shuttleworth in 1854; but as his subdivisions are at present regarded as distinct genera, and these have names of older date, *Stenogyra* as a generic term cannot be employed. These genera, typically, are well defined by the shape of the columellar margin (pillar-lip) of the aperture; but in some aberrant species the differential characters are considerably modified, so that even the distinction between *Opeas* and *Leptinaria* is in some instances not very obvious.

OPEAS.

Bulimus, subgen. *Opeas*, Albers, Die Heliceen, ed. 1, p. 175 (1850).

Stenogyra, sect. *Opeas*, Shuttleworth, in Mittheil. nat. Ges. Bern, 1854, Diagn. no. 6, p. 137; Albers, Die Heliceen, ed. 2, p. 265.

Opeas, Fischer & Crosse, Miss. Scient. Mex., Mollusca, i. p. 592; Strebel, Beitr. Mex. Land- und Süssw.-Conch. v. p. 98.

Shell more or less turrite, with simple columellar margin, not notched, toothed, or strikingly twisted: most of the species with a narrow perforation.

For the anatomy, see the quoted works of Fischer and Crosse, pp. 593–595, and Strebel, pp. 101, 105.

Circumtropical.

The columellar margin appears to be straight and vertical, attenuated towards the base if viewed at a right angle to the plane of the aperture; but if examined obliquely, and thus deeper into the interior of the aperture, the margin is seen to be somewhat spirally twisted.

In order to indicate the differences in the form of the spire by distinct numbers, I use in this and the following genera the proportion of the last whorl in height, as seen from the dorsal side (the side opposite to the aperture), to the whole length of the entire shell.

The generic name is the Greek word for an awl, and neuter.

1. **Opeas subula.** (Tab. XVIII. fig. 3.)

Achatina subula, Pfr. in Archiv f. Naturg. 1839, p. 352 [1].

Bulimus subula, Pfr. Symb. Hist. Helic. i. p. 25 [2]; Monogr. Helic. Vivent. ii. p. 158 [3]; Reeve, Conch. Icon. v., *Bulimus*, t. 69. fig. 494 [4].

Bulimus (*Opeas*) *subula*, Albers, Die Helic. ed. 1, p. 175 [5]; Crosse & Fisch. in Journ. de Conch. xi. p. 361, t. 14. fig. 6 (1863) [6].

Stenogyra (*Opeas*) *subula*, Shuttleworth, in Mittheil. nat. Ges. Bern, 1853, Diagn. neuer Moll. no. 5, p. 138 [7]; v. Mart. in Malak. Blätt. xii. p. 49 (1865) [8]; Binney, Terr. Air-breath. Moll. N. Am. v. p. 195, fig. 99 [9]; Manual Am. Land-Shells, p. 426, fig. 473 (1885) [10].

Opeas subula, Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 600, t. 26. figg. 7, 7 *a*, *b*, and t. 28. figg. 11–13 (jaw and radula, copied from Binney) [11]; Strebel, Beitr. Mex. Land- und Süssw.-Conch. v. p. 163, t. 7. fig. 1, t. 17. fig. 27 [12]; Ancey, in Ann. de Malac. 1886, p. 250 [13].

Hab. E. Mexico: Vera Cruz (*Uhde & Friedel* [8]; *Strebel* [12]); Paso del Macho, along the railway at the foot of the mountains (*Höge*).

Central Mexico: Sayula, in the State of Jalisco (*Höge*: two specimens, both not full-grown); Mexico, without nearer indication of locality (*Uhde* [8]).

S.W. Mexico: Tapana and Cacoprieto, on the Isthmus of Tehuantepec (*Sumichrast* [11 12]).

S.E. Mexico: Chiapas (*Ghiesbreght*); San Juan Bautista in Tabasco (*H. H. Smith*).

British Honduras: Belize (*Bocourt* [11]).

N. Guatemala: Coban (*Sarg* [11]).

W. Guatemala: Antigua, on moist spots on the aqueduct (*Stoll*).

Honduras: Utila Island (*Simpson* [13]).

Central Nicaragua: Acoyapa (*Belt*).

N.E Costa Rica: Puerto Viejo, at the junction of the rivers of Puerto Viejo and Sarapiqui (*Biolley*).

Antilles: Cuba [1 7 11 12], Jamaica [7], Haiti (*Mus. Berol.*), Puerto Rico [7], St. Thomas [7 12], Antigua, Martinique, Barbados, Trinidad.

Also introduced on the mainland of North America at Mobile in Alabama [9 10]; and on that of South America at Maracaibo (*Brown*).

Probably in many places imported with cultivated plants, as exemplified by its occurrence on flower-pots [12]. The record of it from Cochin China, on the coast of the Indian Sea [6], is therefore not so very remarkable.

Opeas rarum (Miller), form B, Strebel, loc. cit. p. 103, t. 7. fig. 5, from Mirador, East Mexico, is perhaps founded on young specimens of *O. subula*.

2. **Opeas bocourtianum.**

Stenogyra bocourtiana, Crosse & Fisch. Journ. de Conch. xvii. p. 424 (1869) [1].

Bulimus bocourtianus, Pfr. Monogr. Helic. Vivent. viii. p. 136 [2].

Opeas bocourtianus, Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 602, t. 26. figg. 8, 8 *a*, *b* [3].

Hab. N. Guatemala: Vera Paz, found by Fischer and Crosse in the stomach of a specimen of *Glandina pinicola* collected by Bocourt [1–3].

E. Costa Rica: Waldeck, near Madre de Dios, 80 metres above the sea, beneath tuna-plants (cactoids) (*Pittier*).

Distinctly broader and more conical than *O. subula*. *O. guatemalense*, var. B, Strebel, loc. cit. p. 105, t. 7. fig. 3, from Colombia and Ecuador, seems to be very like it.

Var. *pittieri*, n. (Tab. XVII. fig. 6.)

Somewhat broad, glossy, diaphanous, distinctly striate; whorls a little more convex, 7 only; general shape as in *O. bocourtianum*; umbilicus almost closed, punctiform; columella somewhat twisted.

Hab. Central Costa Rica: La Palma, 1500 metres above the sea, beneath tuna-plants (cactoids) (*Pittier*).

3. Opeas guatemalense.

Opeas guatemalensis, form A, Strebel, Beitr. Mex. Land- und Süssw.-Conch. v. p. 105, t. 7. fig. 2 *a* [1].

Hab. N. Guatemala: Coban (*Sarg* [1]).

W. Guatemala: Antigua, on moist walls (*Stoll*).

S.W. Costa Rica: on the banks of the Rio Coto, in the Golfo Dulce (*Pittier*).

Var. *majus*, n. (Tab. XVII. fig. 7.)

Very solid, pale yellowish, somewhat shining, finely striated; whorls 9, somewhat angulate and whitish at the suture, which is rather deep. Columellar margin of the aperture straight, vertical, broad, provided with a very fine fold, which runs from inside obliquely to the middle of the outer margin.

Length of the whole shell 15 millim.; diameter $3\frac{1}{2}$; aperture $3\frac{1}{2}$ long, 2 broad. Whorls 9.

Hab. W. Guatemala: Miramar, near San Francisco, in the Costa Cuca (*Stoll*).

4. Opeas colimense.

Stenogyra colimensis, Crosse & Fisch. Journ. de Conch. xvii. p. 425 (1859) [1].

Bulimus colimensis, Pfr. Monogr. Helic. Vivent. viii. p. 133 [2].

Opeas colimensis, Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 603, t. 26. figg. 9, 9 *a*, *b* [3].

Hab. E. Mexico: Cordova (*Höge*).

S.W. Mexico: State of Colima (*Xantus* [1–3]).

A specimen from San Juan Bautista in Tabasco, S.E. Mexico (*H. H. Smith*), probably belongs to this species.

5. Opeas gladiolus. (Tab. XVII. fig. 8.)

Opeas gladiolus, Crosse & Fisch. Journ. de Conch. xxiv. p. 272 (1877) [1]; Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 604, t. 26. figg. 10, 10 *a*, *b* [2].

Hab. N. Guatemala (*Sarg* [1 2]).

The most slender of all these species, the aperture being only one-seventh of the whole length, and the diameter very little more. A small shell, measuring 5 millim. in length and 1 in breadth, and with the aperture 1 millim. in width, found by Herr Höge at Merida, in Yucatan, may be the young of the same species (our fig. 8).

6. Opeas octonoides. (Tab. XVII. fig. 9.)

Bulimus octonoides, C. B. Adams, in Proc. Bost. Soc. Nat. Hist. 1845, p. 72 [1]; Reeve, Conch. Icon. v., *Bulimus*, t. 84. fig. 593 [2]; Pfr. Monogr. Helic. Vivent. iii. p. 400 [3].

Stenogyra octonoides, Binney, Terr. Air-breath. Moll. N. Am. v. p. 194 [4]; Angas, P. Z. S. 1879, p. 485 [5]; v. Mart. Binnen-Mollusken Venezuela's, pp. 35, 36 [6].

Opeas octonoides, Strebel, Beitr. Mex. Land- und Süssw.-Conch. v. p. 102 [7].

Bulimus contractus, Poey, Mem. Hist. Nat. de Cuba, i. p. 205, t. 26. figg. 19, 20 (1851) [8]; Shuttleworth, Mittheil. nat. Ges. Bern, 1854, Diagn. neuer Moll. no. 6, p. 139 [9].

Stenogyra subula (Pfr.), Binney, Terr. Air-breath. Moll. N. Am. ii. p. 285, t. 53. fig. 6 [10].

? *Bulimus plicatellus* (Guppy ?), Tate, Amer. Journ. of Conch. v. p. 157 (1870) [11] (*cf.* Bland, ibid. iv. p. 137, concerning Guppy's species).

Hab. North America: South Carolina and Florida [4 10].

(S.E.) Costa Rica (*Gabb* [5]): probably on the eastern slope (*Biolley & Pittier*).

N. Panama: on an island in the lagoon of Bocas del Toro, in the forest (*Tate* [11]).

Venezuela: Caracas [6].

Antilles: Cuba [4], Jamaica [1 3], Puerto Rico [9], St. Thomas [3], Grenada.

Remarkable by its small size and the large terminal whorls; it has somewhat the appearance of the young state of *O. subula*, but is quite distinct from that species. The Costa Rican specimens I have seen are smaller (length 5–6 millim.) than most of the Antillean and Venezuelan ones (length 7 millim. or more).

7. **Opeas micra.** (Tab. XVII. fig. 10.)

Helix micra, d'Orbigny, Mag. Zool. 1835, Class V. no. 61, p. 9 [1].

Bulimus micra, d'Orbigny, Voy. dans l'Amér. mér., Moll. p. 262, t. 41. figg. 18–20 (1847) [2]; Pfr. Monogr. Helic. Vivent. ii. p. 165 [3] (nec op. cit. iv. p. 462; nec Reeve).

Opeas costato-striatus (Pfr.), Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 598, t. 26. figg. 5, 5 *a*, *b* (part.) [4].

Opeas caracasensis, form B, Strebel, Beitr. Mex. Land- und Süssw.-Conch. v. p. 100, t. 7. fig. 8 *a* [5].

Synopeas caracasensis, Biolley, Moll. Terr. y Fluv. de Costa Rica, p. 16 (1897) [6].

Hab. E. Mexico: Agua Caliente, Camino de Arroyo Hondo, Rancho de Guerrero, Rancho del Eligio, and Camino del Obispo, all near Misantla (*Strebel* [5]).

S.E. Mexico: Teapa and San Juan Bautista in Tabasco (*H. H. Smith*).

N. Guatemala: Coban (*Sarg* [4]).

W. Guatemala: Retalhuleu, in woods, under decayed leaves and rotting pieces of wood (*Stoll*).

N.W. Costa Rica: Bay of Salinas, near Guanacaste (*Pittier*).

N.E. Costa Rica: confluence of the Rio Sarapiqui and the Rio Puerto Viejo, at an elevation of 121 metres (*Biolley* [6]).

Central Costa Rica: Santa Clara, at an elevation of 250 metres above the sea (*Biolley* [6]).

S.W. Costa Rica: Great Range between the Rio Grande and Boruca, El Pital in the valley of Rio Naranjo, at an elevation of 200 metres (*Pittier*).

South America: Venezuela, Guiana, Brazil, Bolivia.

Antilles: Haiti.

Var. *caracasense*. (Tab. XVII. fig. 11.)

Bulimus caraccasensis, Reeve, Conch. Icon. v., *Bulimus*, t. 79. fig. 580 (1849) [7]; Pfr. Monogr. Hèlic. Vivent. iii. p. 404 [8]; iv. p. 464 [9]; vi. p. 102 [10].

Stenogyra (*Opeas*) *caracasensis*, v. Mart. in Albers's Die Helic. ed. 2, p. 265 [11]; Malak. Blätt. xii. p. 48 (1865) [12].

Opeas caracasensis, Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 599, t. 26. figg. 6, 6 *a*, *b* [13]; Strebel, Beitr. Mex. Land- und Süssw.-Conch. v. p. 99, t. 7. fig. 8, t. 17. fig. 30, t. 18. figg. 4, 10 A, B, C, 11, 11 A (radula, jaw, and anatomical details) [14].

? *Bulimus costatostriatus*, Pfr. P. Z. S. 1856, p. 319 [15]; Monogr. Helic. Vivent. iv. p. 460 [16]; Strebel, loc. cit. p. 101 [17].

Hab. E. Mexico: Vera Cruz, on the beach and in the earth of flower-pots (*Strebel* [14], *Friedel* [12], *Berendt* [10]); Cordova (*Sallé* [15]); Orizaba (*Berendt* [10]); Dos Arroyos and Barranca de Mahuistlan, both near Jalapa, in the wood of Pacho, and Mirador, at an elevation of 2630 feet (*Strebel* [14]).

S.E. Mexico: Chiapas (*Ghiesbreght* [9]); Teapa in Tabasco (*H. H. Smith*).

N.W. Costa Rica: Bay of Salinas, near Guanacaste (*Pittier*).

S.W. Costa Rica: Savana of Guacimo, at an elevation of 200 metres above the sea, valley of the Rio Brus (*Pittier*); Turubanes, at an elevation of 500 metres above the sea (*Biolley* [8]).

Panama (*Bland* [10]).

South America: Colombia, Venezuela, Guiana, Brazil.

Antilles: Haiti, Guadeloupe, St. Lucia, Barbados, Grenada, Trinidad.

The typical shorter form (*micra*) of this species is represented in the Berlin Museum from Haiti, Caracas, and Rio Janeiro (here found by myself); the longer form (*caracasense*) from S. Paulo in Southern Brazil (*v. Ihering*); both from La Guayra in Venezuela (*Gollmer*) and Paramaribo in Guiana (*coll. Dunker*). D'Orbigny's type was from Santa Cruz de la Sierra in Bolivia, and he mentions also specimens from Rio Janeiro. As regards the Antilles, the following smaller and more southern islands are mentioned as localities for *O. caracasense* by Bean, Guppy, and Tate: Guadeloupe, St. Lucia, Barbados, Grenada, and Trinidad. In Cuba, Jamaica, and Puerto Rico, on the contrary, the malacological fauna of which is very well known, it has not yet been found.

The difference between the typical form (*micra*) and the longer (*caracasense*) is rather striking, but intermediate forms occur. The strength of the costæ is also subject to variation.

Pfeiffer, Fischer and Crosse, and Strebel treat *O. micra* and *O. caracasense* as distinct; but a comparison of d'Orbigny's original figure of *O. micra* with those of *O. caracasense* will show their extreme resemblance. Some confusion, however, has occurred concerning the identification of d'Orbigny's species, for in the collections of the principal authorities, as in those of Cuming (Reeve, Conch. Icon. figg. 78 and 579), Pfeiffer (Strebel, *loc. cit.* t. 7. fig. 4 and t. 17. fig. 15), and Albers (now in the Berlin Museum), there are, with the name "*micra*, d'Orb.," shells which do not at all agree with d'Orbigny's description and figure, but are more like the young forms of *O. subula*. Pfeiffer [8] was

right in adding a note of interrogation to his description in vol. iii. p. 400 of his monograph, but wrong in omitting it in the later volumes. The figures on our Plate represent the most slender and the most robust of the specimens found at Teapa by H. H. Smith.

The name "*micra*" is properly an adjective and feminine, and d'Orbigny retained the feminine form when referring it to *Bulimus* in his later work, although this name is masculine; and so it may be also maintained in the neuter *Opeas*, regarding it as a case of apposition, "the female little one," in order to avoid the use of the terms *micrum* or *micron*.

8. **Opeas (?) tryonianum.**

Bulimus tryonianus, Tate, Amer. Journ. of Conch. v. p. 157, t. 16. fig. 4 (1870) [1]; Pfr. Monogr. Helic. Vivent. viii. p. 139 [2].

Hab. N. Panama: on an island in the lagoon of Bocas del Toro, in the forest (*Tate* [1 2]).

Var. *subovale*, n. (Tab. XVII. fig. 12.)

A little more ovate; umbilicus narrow, but not closed.

Hab. S.W. Costa Rica: Turubanes, at an elevation of 500 metres above the sea (*Biolley*).

9. **Opeas (?) semistriatum.**

Bulimus semistriatus, Morelet, Test. Noviss. ii. p. 10 (1851) [1]; Pfr. Monogr. Helic. Vivent. iii. p. 441 [2].

Bulimulus semistriatus, Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 555, t. 20. figg. 14, 15 [3].

Hab. S.E. Mexico: Palenque, in woods (*Morelet* [1–3]).

Although placed by the learned French authors in the genus *Bulimulus*, it seems to me to be nearer related to *O. micra*.

SUBULINA.

Achatina, subgen. *Subulina*, Beck, Index Moll. p. 76 (1837); Albers, Die Helic. ed. 1, p. 195.

Stenogyra, sect. *Subulina*, Shuttleworth, in Mittheil. nat. Ges. Bern, 1854, Diagn. neuer Moll. no. 6, p. 138; Albers, Die Helic. ed. 2, p. 266.

Subulina, Fischer & Crosse, Miss. Scient. Mex., Mollusca, i. p. 626 (part.); Strebel, Beitr. Mex. Land- und Süssw.-Conch. v. p. 114.

Shell cylindrically turrite, imperforate; columellar margin distinctly notched at the base; apex generally rather thick, globose; sculpture feeble. Lateral teeth of the radula tricuspidate, the middle cusp the longest.

For the living animal and the anatomy, see the quoted works of Fischer, *loc. cit.* pp. 628–630, t. 28. figg. 1–7, and Strebel, *loc. cit.* p. 115, t. 18.

Comparative Table of the Species of *Subulina*.

Nomen.	Forma.	Sculptura.	Coloratio.	Anfractus.	Apertura.	Long.	Diam.	Aperturæ.		Patria.
								Long.	Diam.	
octona, *Chemn.*	cylindrico-turrita, apice obtuso.	subtilissime striatula.	cerea, diaphana.	8–10, convexiusculi, ult. 1 : 3⅓.	sinuato-ovata, marg. col. concavo.	mm. 15–20	mm. 4–4⅔	mm. 4–4½	mm. 2–2⅓	E. Mexico to N. Panama.
——, var. strebeli, *v. Mart.*	,,	,,	cerea vel flavida, diaphana.	11–12, convexiusculi, ult. 1 : 5.	,,	25–26	5	4	2⅕	Campeche.
——, var. trochlea, *Pfr.*	,,	,,	,,	9½–10½, convexiusculi, ult. 1 : 4.	,,	19–23	4½–5	4–4½	2–2½	S.E. Mexico, S.E. & S.W. Costa Rica.
stolli, *v. Mart.*	elongate turrita.	verticaliter conferte costulato-striata.	albida.	11, vix convexiusculi, ult. 1 : 3½.	oblongo - elliptica, marg. col. valde concavo.	24	5½	5	3½	N. Guatemala.
porrecta, *v. Mart.*	cylindrico-subulata.	leviter striatula.	flavido-cerea, nitidula.	9½, planiusculi, ult. 1 : 3½.	elongato - ovata, marg. col. vix concavo.	21–25	4½–5	4½–4⅔	2–2½	S.E. Mexico.
cylindrella, *Morel.*	subulato - turrita, apice subgloboso.	costulis distantibus, tenuibus.	pallide cornea, hyalina.	11, convexiusculi, ult. 1 : 3.	rotundato-quadrata, marg. col. concavo.	8	2	1½	1	N. Guatemala.
? rangiana, *Pfr.*	conico-turrita.	levissime arcuatim substriata.	straminea, apice albo, solida.	11, planulati, ult. 1 : 2⅔.	marg. col. recto, incrassato.	39–42	11–13	11½	5–7	Mexico.

1. Subulina octona.

Helix octona, Chemnitz, Syst. Conch.-Cab. ix. 2, p. 120, t. 136. fig. 1264 (1786) [1]; Dillwyn, Descr. Cat. of Shells, ii. p. 654 [2] (nec Linn.).

Bulimus octonus, Bruguière, in Encycl. Méth. i. p. 325 (1792) [3]; Lamarck, Hist. Anim. sans Vert. ed. 1, vi. p. 124 [4]; ed. 2, viii. p. 233 [5].

Achatina octona, Gray, in Ann. Philos. n. ser. ix. p. 414 (1825) [6]; d'Orbigny, in Ramon de la Sagra's Hist. Nat. de Cuba, Moluscos, p. 168, t. 11. figg. 4–6 [7]; Voy. dans l'Amér. mérid., Mollusca, p. 260 [8]; Pfr. Monogr. Helic. Vivent. ii. p. 266 [9]; Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, *Bulimus* and *Achatina*, p. 342, t. 37. figg. 19, 20 [10]; Reeve, Conch. Icon. vi., *Achatina*, t. 17. fig. 84 [11]; Tristr. P. Z. S. 1861, p. 230 [12]; Tate, Amer. Journ. of Conch. v. p. 157 (1870) [13].

Subulina octona, Beck, Index Moll. p. 77 (1837) [14]; H. & A. Adams, Gen. Moll. ii. p. 110, t. 71. fig. 3 *a* [15]; Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 640, t. 25. figg. 15, 15 *a* [16]; Biolley, Molusc. terr. y fluv. de Costa Rica, p. 15 [17].

Stenogyra (*Subulina*) *octona*, Shuttleworth, in Mittheil. nat. Ges. Bern, 1854, Diagn. neuer Moll. no. 6, p. 141 [18]; Wiegm. in Weber's Zool. Ergebn. Reise Niederl. Indien, iii. 1, p. 210, t. 15. figg. 18–26, t. 16. figg. 1–7 (anatomy) (1894) [19].

Sira octona, Ad. Schmidt, Geschlechtsapparat. d. Stylommatophoren, pp. 5, 42 (radula) (1855) [20].

Stenogyra octona, Binney, Ann. N. York Acad. Sci. iii. p. 100 (1881) (jaw and radula described) [21].

Hab. E. Mexico: Vera Cruz (*Uhde, in Mus. Berol.*; *Höge*).

S.E. Mexico: Teapa in Tabasco (*H. H. Smith*).

British Honduras: Belize (*Bocourt* [16]).

N. Guatemala: Vera Paz (*Stoll*); Coban (*Salvin* [12]).

W. Guatemala: Hacienda Helvetia, in Upper Cholhuitz, Costa Cuca (*Stoll*: young).

Central Nicaragua: throughout the savana region, Grenada, San Ubaldo (*Tate* [13]).

E. Nicaragua: Castillo and Greytown (*Tate* [13]).

E. Costa Rica: Talamanca (*Pittier*); Turrialba, at an elevation of 550 metres above the sea, on the ground, at the roots of trees, in moss or under decayed leaves (*Biolley* [17]).

S.W. Costa Rica: Puerto Lagarto, 70 metres above the sea, in the valley of the Rio Grande de Terraba; Boca de Corredor, in the valley of Coto, and San Domingo, both in the Golfo Dulce (*Pittier*).

N. Panama: Boca del Toro, Naval Bay, and Matachin (*Tate* [13]).

South America: Venezuela, Ecuador, Guiana, Northern Brazil.

Antilles: Cuba, Jamaica, Haiti, Puerto Rico, St. Thomas, Tortola, Antigua, Guadeloupe, Martinique, St. Lucia, Barbados, Trinidad, &c.

Also recorded from Zanzibar, Madagascar, Sumatra, Java, and New Caledonia. It is widely spread in the West-Indian Islands.

Var. *strebeli*.

Stenogyra (*Subulina*) *trochlea*, Pfr. ?, v. Mart. in Malak. Blätt. xii. p. 49 (1865) [22].
Subulina trochlea, no. 2, Strebel, loc. cit. p. 116, t. 7. fig. 16 (right figure, magnified) [23].

Somewhat longer (25–26 millim.), with more whorls (11–12) and a comparatively small aperture.

Hab. CAMPECHE: in the court of a house (*Berendt* [23]).

The locality Vera Cruz quoted by me [22] is incorrect, C. Friedel having received his specimen from Berendt himself, as stated by Strebel [23].

Var. *trochlea*. (Tab. XVII. figg. 13, 13 *a*, 13 *b*.)

Achatina trochlea, Pfr. Symb. Hist. Helic. ii. p. 59 (1842) [24]; Monogr. Helic. Vivent. ii. p. 266 [25]; Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, *Bulimus* and *Achatina*, p. 343, t. 37. figg. 23, 24 [26].

Subulina trochlea, form A, Strebel, Beitr. Mex. Land- und Süssw.-Conch. v. p. 115, t. 7. fig. 16 (left figure, magnified), t. 17. fig. 32 (aperture), t. 18. figg. 1 (radula), 12–16 and 18–24 (anatomical details) [27].

? *Stenogyra octona*, Angas, P. Z. S. 1879, p. 485, t. 40. fig. 16 (living animal) [28].

A little longer than the normal specimens of *S. octona*, the last whorl seen from the dorsal side distinctly higher than broad.

Hab. MEXICO (*Hegewisch* [24–27]).

S.E. MEXICO: Teapa in Tabasco (*H. H. Smith*).

YUCATAN: Merida (*Ravensburg* [27]).

S.E. COSTA RICA: Old Harbour (*Gabb* [28]).

S.W. COSTA RICA: wood of Palmar in the valley of the Rio Grande de Terraba, at the roots of large trees (*Pittier*).

According to Pfeiffer [25], his *S. trochlea* is distinct from *S. octona* by the broader and more convex whorls, a more concave columellar margin, and a more elliptic form of the aperture. To judge from his figure [26], the whole shell is comparatively more slender, especially the last whorl, which, seen from the dorsal side, is higher than broad, whereas in *S. octona* it is as broad as high. Strebel [27], who had before him specimens of *S. trochlea* from Pfeiffer's collection, identifies them with those from Merida which he describes and figures, and also with others from Cuba, Jamaica, and Brazil, labelled "*S. octona*," and states that he does not know any other *S. octona*. Specimens of *S. trochlea* in the collection of Dunker, Pfeiffer's friend, do not differ at all from *S. octona*. The difference between his *S. trochlea* and the widely-spread *S. octona* cannot, therefore, be very essential. Strebel's figure also shows the last whorl somewhat higher than broad, so I use this character and the larger size to define the variety *trochlea*, and refer to it some specimens from Tabasco and Costa Rica; in the convexity of the whorls and curvature of the columellar margin I find no constant difference. The measurements are:—

Long. 23, diam. 5 ; apert. long. $4\frac{1}{2}$, lat. $2\frac{1}{2}$ millim.; anfr. 10 (*Pfeiffer*).
„ 22·3, „ 4·7 ; „ 4·1, „ 2·2 „ „ $10\frac{1}{2}$ (*Strebel*).
„ 21, „ 5 ; „ 4, „ 2 „ „ 10 (specimen from Teapa).
„ 19, „ $4\frac{1}{2}$; „ 4, „ 2 „ „ $9\frac{1}{2}$ (specimen from Palmar).

2. **Subulina stolli,** sp. n. (Tab. XVII. figg. 15, 15 *a*, *b*.)

Testa imperforata, elongate turrita, sat tenuis, costulis verticalibus tenuibus confertis sculpta, nitidula, albida, concolor, apice obtuso ; anfr. 11, priores duo prominentiis nonnullis tuberiformibus lævibus insignes, sequentes vix convexiusculi, sutura sat profunda, subirregulari, incrustata, ultimus basi rapide attenuatus, lævis ; apertura oblongo-elliptica, margine externo leviter arcuato, basali brevi, columellari valde concavo, ad basin distincte truncato.

Long. 24, diam. $5\frac{1}{2}$; apert. long. 5, diam. $3\frac{1}{2}$ millim.
Last whorl, seen from the dorsal side, two-sevenths of the length of the whole shell.

Hab. N. Guatemala : Vera Paz (*Stoll*).

General form a little more conical than in *S. octona*, from which it is well distinguished by the sculpture. The species cannot be referred to any of the sculptured *Subulinæ* described by Fischer and Crosse from Guatemala. The strong protuberances on the first two whorls are very peculiar.

3. **Subulina porrecta,** sp. n. (Tab. XVII. figg. 14, 14 *a*, *b*.)

Subulina trochlea (Pfr.), Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 642, t. 25. figg. 14, 14 *a* [1].

Testa imperforata, cylindrico-subulata, solidula, leviter striatula, flavido-cerea, modice nitidula, concolor, apice globiformi ; anfr. $9\frac{1}{2}$, superi convexiusculi, inferiores planiusculi, vix latiores quam alti, ultimus basi altior quam latus, basi sensim attenuatus ; apertura elongato-ovata, margine columellari vix concavo, versus basin peroblique truncato.

Long. 21–25, diam. $4\frac{1}{2}$–5 ; apert. long. $4\frac{1}{2}$–$4\frac{2}{3}$, diam. 2–$2\frac{1}{2}$ millim.

Hab. S.E. Mexico : Teapa in Tabasco (*H. H. Smith*).
Yucatan [1].

Distinct from *S. octona* and its variety *trochlea* chiefly by the more slender and less convex form of the last whorls and the scarcely concave columellar margin.

4. **Subulina cylindrella.**

Achatina cylindrella, Morelet, Test. Noviss. ii. p. 12 (1851) [1] ; Pfr. Monogr. Helic. Vivent. iii. p. 502 [2] ; Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 634, t. 25. figg. 13, 13 *a*, *b* [3].

Hab. N. Guatemala : woods of Peten, near San Luis, rather scarce (*Morelet* [1–3]).

Distinct from the species of *Pseudosubulina* by the less numerous costæ, with large interstices, and by the form of the columellar margin, which agrees very well with that of *S. octona*. Fischer and Crosse are of opinion that the only specimen which they have seen (and figured) is not full-grown.

5. **Subulina (?) rangiana.**

Achatina rangiana, Pfr. P. Z. S. 1846, p. 115 [1] ; Monogr. Helic. Vivent. ii. p. 261 [2] ; Reeve, Conch. Icon. v., *Achatina,* t. 15. fig. 65 [3].

Stenogyra (*Obeliscus*) *rangiana*, v. Mart. in Albers's Die Helic. ed. 2, p. 264 [4].
Subulina rangiana, Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 638 [5].

Hab. Mexico (*Linden* [1–5]).

It is strange that no more specimens of this comparatively large shell (length 39–42 millim.) have been found by any subsequent collector; the Mexican habitat appears, therefore, to require confirmation. As regards its systematic position, it approaches by the size, solidity, and colour, and by the rectilinear columella, nearer to the group *Obeliscus*, which belongs to the South-American continent.

PSEUDOSUBULINA.

Subulina, Sect. I. Species Costulatæ, and Sect. II. Species Costulato-striatæ, Fischer & Crosse, Miss. Scient. Mex., Mollusca, i. p. 632 (1877).
Pseudosubulina, Strebel, Beitr. Mex. Land- und Süssw.-Conch. v. p. 117 (1882).

Shell turrite, vertically sculptured, glossy; columellar margin straight, slightly notched near the base. Teeth of the radula in very oblique rows, lateral teeth elongate, entire or bifid at the tip, median tooth and jaws rudimentary. (Strebel, *loc. cit.* p. 118, t. 18. figg. 5–8.)

So far as at present known, the genus is confined to Mexico and Central America.

Pseudosubulina should be placed in the family Agnatha, after *Salasiella*, anteà, p. 83, according to the structure of its oral organs; but as this character was not sufficiently known to me when dealing with that family, I am compelled to leave the genus near *Subulina*, which has a very similar shell, a position also assigned to it by Fischer and Crosse, and even Strebel.

1. Pseudosubulina berendti.

Achatina berendti, Pfr. Malak. Blätt. ix. p. 98 (1862)[1]; Monogr. Helic. Vivent. vi. p. 237 [2].
Subulina berendti, Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 635, t. 26. figg. 1, 1 *a*, *b* (not adult) [3].
Pseudosubulina berendti, Strebel, Beitr. Mex. Land- und Süssw.-Conch. v. p. 117, t. 7. figg. 7, 7 *a*, t. 17. fig. 2 (aperture), t. 18. figg. 5–8 and 23 A, B, C (radula and genital organs) [4].

Slenderly turrite, densely costulato-striate, shining, yellowish brown; 12–12½ whorls, the uppermost forming a blunt subglobular apex, the following moderately convex, with rather deep sutures, which appear dark in places by adhering dirt, the last whorl gradually narrowing beneath, smooth at the base, imperforate. Seen from the dorsal side, the last whorl is a little more than one-fourth of the whole length and equal to the diameter. Aperture narrowly oval; columellar margin somewhat concavely arched, whitish, with a nearly vertical distinct notch at the lower end.

Length 12½–13, diameter 2⅔–3 millim.; aperture 2⅔ long, 1⅓ broad.

Hab. E. Mexico: Orizaba (*Berendt* [1 2 3]); Pacho, Soncoautla, Consolapa, and Dos Arroyos, all near Jalapa (*Estefania Salas* [4]); Las Vigas (*Höge*).

Comparative Table of the Species of *Pseudosubulina*.

Nomen.	Forma.	Sculptura.	Coloratio.	Anfractus.	Apertura.	Long.	Diam.	Aperturæ.		Patria.
								Long.	Diam.	
						mm.	mm.	mm.	mm.	
berendti, *Pfr.*	subulato-turrita, apice subgloboso.	confertim costulato-striata.	flavo-fusca, nitida, subdiaphana.	12–12½, ult. 1 : 4.	anguste ovata, marg. col. concaviusculo.	12½–13	2⅔–3	2⅔	1⅓	E. Mexico.
——, var. gracilior, *v. Mart.*	,,	,,	,,	10½-11, ult. 1 : 4.	,,	9½–11½	2⅓–2½	2–2¼	1–1⅓	E. Mexico.
chiapensis, *Pfr.*	cylindrico-turrita.	conferte plicato-striata.	cerea, nitida, pellucida.	9–10, convexi.	tetragono-ovalis, marg. col. crasso strictiusculo.	16	3½	3⅔	1¾	S.E. Mexico, Guatemala.
sargi, *Cr. & F.*	,,	,,	olivaceo-cornea, nitida.	9, convexiusculi, ult. 1 : 2¾.	subtetragono-ovalis, marg. col. concavo.	14	3	3	2⅓	S.E. Mexico, N. Guatemala.
trypanodes, *Pfr.* ...	,,	conferte plicata	albido-cerea, nitidula.	12, convexiusculi, ult. 1 : 3½.	elliptico ovalis, marg. col. leviter concavo.	13	3	2⅔	2½	S.E. Mexico.
robusta, *v. Mart.* ...	subconico-turrita.	confertim costulato-striata.	flavescens, nitida.	10, vix convexiusculi, ult. 1 : 3.	trapezoidea, marg. col. stricto.	18	5	4½	2½	S.W. Mexico.
fortis, *v. Mart.* ...	cylindrico-turrita.	distincte costulata.	pallide griseo-flavida.	9–9½, convexiusculi, ult. 1 : 3.	anguste oblonga, marg. col. crasso, subverticali.	13–14	4	4	2¼	W. Guatemala.
mitescens, *v. Mart.*...	subulato-turrita.	costulis planis approximatis, in anfr. ult. obsolescentibus.	flavida, diaphana, nitida.	10, planiusculi, ult. 1 : 3½.	,,	16	4	4	2⅓	W. Guatemala.
lirifera, *Morel.*	,,	costis rectis validis approximatis.	læte cornea, nitida.	10, convexiusculi, ult. 1 : 3½.	anguste oblonga, marg. col. valde concavo.	12–15	3–3½	2¼–3	1½	N. & E. Guatemala.
salvini, *v. Mart.* ...	,,	confertim striatula.	albida.	8½, convexiusculi, ult. 1 : 3.	trapezoidea, marg. col. obliquo.	10	2½	1⅔	1⅓	N. Guatemala.

Var. *gracilior*, n.

Pseudosubulina berendti, form B, Strebel, loc. cit. p. 119, t. 7. fig. 7 *a* [5].

Whorls $10\frac{1}{2}$–11, the last, if seen from the dorsal side, a little more than one-fourth of the whole length of the shell, which varies from $9\frac{1}{2}$ to $11\frac{1}{2}$ millim.; diameter $2\frac{1}{3}$–$2\frac{1}{2}$; aperture 2–$2\frac{1}{4}$ in length, and 1–$1\frac{1}{2}$ in breadth.

Hab. E. Mexico: Vera Cruz and Mirador (*Strebel* [5]); Cordova (*Höge*).

2. Pseudosubulina (?) chiapensis.

Achatina chiapensis, Pfr. P. Z. S. 1856, p. 379 [1]; Malak. Blätt. iii. p. 234 (1856) [2]; Monogr. Helic. Vivent. iv. p. 616 [3].

Subulina chiapensis, Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 637, t. 26. figg. 2, 2 *a*, *b* [4].

Pseudosubulina chiapensis, Strebel, Beitr. Mex. Land- und Süssw.-Conch. v. p. 119, t. 7. fig. 17 [5].

Hab. S.E. Mexico: Chiapas (*Ghiesbreght* [1–3 5]).

Guatemala (*Sarg* [4]).

It is not quite certain that the Guatemalan shell described and figured by Fischer and Crosse belongs to Pfeiffer's species, which has been redescribed by Strebel from Chiapas specimens; but as I have no examples from either locality for examination, I can offer no opinion concerning them.

3. Pseudosubulina (?) sargi.

Subulina sargi, Crosse & Fisch. Journ. de Conch. xxv. p. 272 (1877) [1]; Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 637, t. 26. figg. 3, 3 *a*, *b* [2].

Hab. S.E. Mexico: Teapa in Tabasco (*H. H. Smith*).

N. Guatemala: Coban (*Sarg* [1 2]).

The glossy surface with fine crowded costæ ("stries pliciformes et serrées") seems to place this species in the genus *Pseudosubulina*, although the columellar margin is said to be arcuated and provided with a notch, which does not reach the basal end.

4. Pseudosubulina (?) trypanodes. (Tab. XVII. figg. 16, 16 *a*, *b*.)

Achatina trypanodes, Pfr. P. Z. S. 1856, p. 379 [1]; Malak. Blätt. iii. p. 234 (1856) [2]; Monogr. Helic. Vivent. iv. p. 616 [3].

Subulina trypanodes, Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 636 [4].

Hab. S.E. Mexico: Chiapas (*Ghiesbreght* [1–4]).

Nowhere figured. According to the description, it somewhat resembles *P. fortis* in size and colour, but is at once distinguished by the number of whorls being twelve at the length of 13 millim.

I am indebted to Mr. Edgar Smith for a drawing of the type of this species, and from this our figures are taken. The form of the aperture confirms me in the supposition that the species may belong to the genus *Pseudosubulina*, but this cannot be definitely decided till the structure of the radula is known.

5. **Pseudosubulina robusta,** sp. n. (Tab. XVII. fig. 19.)

Testa imperforata, subconico-turrita, verticaliter confertim costulato-striata, nitida, flavescens; anfr. 10, primi 2 subglobosi, læves, tertius subangustus, inde a quarto regulariter crescentes et sculpti, sutura sat impressa, ultimus basi sensim et subconvexe attenuatus; apertura sat obliqua, oblongo-trapezoidea, margine externo supra arcuato, dein stricto, margine basali late rotundato, marg. columellari paulum torto, leviter incrassato, albido, basi leviter truncato.

Long. 18, diam. 5; apert. long. $4\frac{1}{2}$, diam. $2\frac{1}{2}$ millim.

Last whorl, seen from the dorsal side, one-third of the whole length.

Hab. S.W. Mexico, Omilteme, in the State of Guerrero, at an elevation of 8000 feet (*H. H. Smith*).

6. **Pseudosubulina fortis,** sp. n. (Tab. XVII. figg. 17, 17 *a*, *b*.)

Testa imperforata, cylindrico-turrita, distincte costulata, costulis latiusculis, interstitia subæquantibus, solidula, pallide griseo-flavida; anfr. 9–$9\frac{1}{2}$, convexiusculi, sutura profunda, crenulata, ultimus infra sensim angustatus, basi læviuscula; apertura anguste oblonga, margine externo leviter arcuato, basali breviusculo, columellari *subverticali*, crasso, oblique et leviter truncato.

Long. 13–14, diam. 4; apert. long. 4, diam. $2\frac{1}{4}$ millim.

Last whorl, seen from the dorsal side, one-third of the whole length. The deep sutures are often filled with dirt, and thus appear dark brown.

Hab. W. Guatemala: El Reposo (800 feet), Las Mercedes (3000 feet), and Zapote (*Champion*); Miramar near San Francisco and Retalhuleu (*Stoll*).

7. **Pseudosubulina mitescens,** sp. n. (Tab. XVII. figg. 18, 18 *a*, *b*.)

Testa imperforata, subulato-turrita, costulato-striata, costulis planiusculis, interstitia latitudine superantibus, in anfr. antepenultimo, penultimo et ultimo deorsum *obsolescentibus*, diaphana, flavida, nitida; anfr. 10, primus parvus, subglobosus, secundus multo major, sequentes planiusculi, sutura anguste impressa, crenulata, fuscescente, antepenultimus et penultimus impressionibus spirali-linearibus sparsis notati, ultimus basi lævis, rapide angustatus; apertura anguste oblonga, margine externo leviter arcuato, basali breviusculo, columellari subverticali, crasso, oblique et leviter truncato.

Long. 16, diam. 4; apert. long. 4, diam. $2\frac{1}{3}$ millim.

Hab. W. Guatemala: Dueñas, near Antigua, at an elevation of 5000 feet above the sea (*Champion*).

Intermediate between *P. fortis* and *P. lirifera*—in the sculpture and the flatness of the costæ resembling the latter, and in the shape of the aperture the former; costæ stronger on the upper whorls and becoming very feeble in the lower parts of the last three whorls, this character being quite peculiar to the species.

8. **Pseudosubulina lirifera.** (Tab. XVII. figg. 20, 20 *a*, *b*.)

Achatina lirifera, Morelet, Test. Noviss. ii. p. 12 (1851)[1]; Pfr. Monogr. Helic. Vivent. iii. p. 501[2].

Subulina lirifera, Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 633, t. 25. figg. 12, 12 *a*, *b*[3].

Hab. N. Guatemala: woods of Peten, near San Luis (*Morelet* [1–3]).

E. Guatemala: Livingston (*Stoll*).

The first two whorls are smooth, the third and fourth comparatively large, subglobose, and provided with strong, but narrow costæ (fig. 20 *a*); on the fifth whorl commence the broad and flat costæ, with very narrow interstices, the sculpture being similar on all the following whorls. The whorls are very feebly convex, rather flat, chiefly the lower ones; the last whorl, seen from the dorsal side, is two-sevenths of the whole length of the shell. The aperture is small, the columellar margin very concavely arcuated. The two examples from Livingston, on the Atlantic coast, are of larger size than those described by Morelet, and Fischer and Crosse, viz.:—

Specimens from Peten..... Whorls 9–10: length 12–13, diam. 3; apert. long. $2\frac{1}{4}$, diam. $1\frac{1}{2}$ millim.
Specimens from Livingston .. „ $11\frac{1}{2}$: „ 15, „ $3\frac{1}{2}$; „ 3, „ $1\frac{1}{2}$ „

Nevertheless, the specimens from Livingston agree so well with Fischer and Crosse's figure of *Subulina lirifera* that I do not think they can be separated, not even as a variety. The very concave shape of the columellar margin gives the species somewhat the facies of *Tornaxis*.

9. **Pseudosubulina (?) salvini,** sp. n. (Tab. XVII. figg. 21, 21 *a*, *b*.)

Achatina trypanodes, Tristram, P. Z. S. 1863, p. 411 (nec Pfr.)[1].

Testa subulato-turrita, rimata, perpendiculariter confertim striatula, nitida, albida; anfr. $8\frac{1}{2}$, convexiusculi, sutura sat profunda, primus subglobosus, papilliformis, sat magnus, ceteri regulariter crescentes, ultimus basi celeriter angustatus; apertura subperpendicularis, trapezoidea, margine externo subrectilineo, basali anguste rotundato, columellari obliquo, in medio protuberante, prope basin oblique subtruncato.
Long. 10, diam. $2\frac{1}{2}$; apert. long. $1\frac{2}{3}$, diam. $1\frac{1}{3}$ millim.
Last whorl, seen from the dorsal side, to the whole length as $1 : 3\frac{1}{2}$.

Hab. N. Guatemala: Vera Paz (*Salvin*[1]).

A comparison of our figure of this shell, drawn from Salvin's specimen, with fig. 16, taken from the type of *P. trypanodes* (Pfr.), will show the differences between these two forms. It is somewhat strange that this species should not be found amongst the numerous Guatemalan shells described by French authors, but I cannot identify it with any of those enumerated in Fischer and Crosse's work; the nearest seems to be *P. sargi*, from which the present species may be known by the less convex whorls, the stronger sculpture, and the different form of the outline of the columellar margin. The last-mentioned character makes it even doubtful whether this shell belongs really to the genus *Pseudosubulina*.

SPIRAXIS.

Spiraxis, C. B. Adams, Contrib. Conch. no. 6, p. 87 (1850).
Spiraxis, Sect. II. *Bulimiformes,* Shuttleworth, in Mittheil. nat. Ges. Bern, 1852, Diagn. neuer Moll. no. 2, p. 27; Pfeiffer, Monogr. Helic. Vivent. ii. p. 469.
Spiraxis, sect. *Euspiraxis,* Pfeiffer, Zeitschr. f. Malak. 1855, p. 166; Albers, Die Helic. ed. 2, p. 34.

Comparative Table of the Species of *Spiraxis*.

Nomen.	Forma.	Sculptura.	Coloratio.	Anfractus.	Apertura.	Long.	Diam.	Aperturæ.		Patria.
								Long.	Diam.	
scalariopsis, *Morel.*	subconico-turrita.	costulis sat distantibus, acutis.	luteo-albida, subdiaphana.	9, convexi, ult. 1 : 3¼.	angulato-ovata, marg. col. modice torto.	mm. 11	mm. 4	mm. 2½	mm. 1½	N. Guatemala.
sulciferus, *Morel.*	oblongo-turrita.	costulis subrectis, compressis; anfr. penult. 24–27, anfr. ult. crebrioribus.	corneo-albida, subdiaphana.	8–9, convexiusculi, ult. 1 : 3.	piriformis, marg. col. valde torto, crasso.	8–9½	2½–2¾	2–2¼	1–1½	E. & S.E. Mexico, W. Guatemala.
——, var. cobanensis, *F. & Cr.*	obese turrita.	,,	,,	7½, convexiusculi, ult. 1 : 2⅓.	,,	7	2½	2	1¼	N. Guatemala.
——, var. berendti, *Pfr.*	oblongo-turrita.	costulis subrectis, compressis, æqualiter crebris.	subhyalino-albida.	8, convexi, ult. 1 : 3.	,,	6½–7½	2⅓	1⅘–2	1¼	E. Mexico.
tenuis, *Pfr.*	oblongo-turrita, apice obtusiusculo.	costulis filiformibus, confertis, sutura subcrenulata.	virenti-hyalina, pellucida.	9, convexiusculi, ult. 1 : 2⅘.	subrhombeo-ovalis, marg. col. leviter torto, basi subtruncata?	8	3	2¼	?	E. Mexico.
acus, *Shuttl.*	subulato-turrita, apice acutiusculo.	costulis argutis, regularibus.	corneo-albida.	12–13, medio planati, sutura profunda.	"semiovalis," marg. col. calloso.	16	2½	3	1¾	E. Mexico.
——, var. minor, *F. & Cr.*	,,	,,	,,	9, ult. 1 : 2⅘.	piriformis, marg. col. modice torto, crasso.	6	1	1⅔	1	E. Mexico.
tenuecostatus, *Streb.*.....	oblongo-turrita.	costulis subtilibus, confertis, æqualiter crebris.	,,	7, convexiusculi, ult. 1 : 2½.	oblongo-piriformis, marg. col. modice torto, tenui.	7⅓	2½	2⅕	1⅔	E. Mexico.
miradorensis, *Streb.*.....	elongato-turrita.	costulis sat validis, rectis; anfr. penult. c. 22, sutura crenulata.	,,	8, convexi, ult. 1 : 3.	oblongo-elliptica, marg. col. minus torto.	5¼	1⅓	1⅕	½	E. Mexico.

similaris, *Streb.*	oblongo-turrita.	costulis compressis; anfr. ult. 30–33, sutura crenulata.	„	$8\frac{1}{2}$, convexiusculi, ult. 1 : 3-$3\frac{1}{3}$.	oblongo-elliptica, marg. col. modice torto.	$5\frac{2}{3}$	$1\frac{4}{5}$	$1\frac{1}{2}$	$\frac{4}{5}$	E. Mexico.
confertecostatus, *Streb.* .	„	costulis subtilissimis, confertissimis; anfr. penult. 55–60.	„	$7\frac{1}{2}$, convexiusculi, ult. 1 : $2\frac{2}{3}$.	anguste piriformis, marg. col. minus torto.	$4\frac{4}{5}$	$1\frac{1}{2}$	$1\frac{1}{5}$	$\frac{2}{3}$	E. Mexico.
intermedius, *Streb.*	elongato-turrita.	costulis validioribus, rectis; anfr. penult. 40.	„	9, planiusculi, ult. 1 : $3\frac{1}{4}$.	truncato-ovalis, marg. col. paulum torto, a marg. basali magis distincto.	$5\frac{1}{5}$	$1\frac{1}{2}$	$1\frac{1}{5}$	$\frac{1}{2}$	E. Mexico.
confertestriatus, *Streb.*...	„	striis subtilibus, confertissimis, rectis.	„	$7\frac{1}{2}$–$7\frac{3}{4}$, planiusculi, ult. 1 : 3.	anguste ovalis, marg. col. modice torto, sat tenui.	$4\frac{1}{2}$	$1\frac{1}{3}$	$1\frac{1}{3}$	$\frac{1}{2}$	E. Mexico.
nitidus, *Streb.*	subulato-turrita.	striis subtilibus, inæqualibus, rectis.	flavido-cornea, valde nitida.	$8\frac{3}{4}$, planiusculi, ult. 1 : $3\frac{1}{4}$.	anguste ovalis, marg. col. modice torto.	$8\frac{1}{3}$	$2\frac{1}{3}$	$2\frac{1}{5}$	$1\frac{1}{3}$	E. Mexico.
——, var. major, *v. Mart.*	„	fere lævis.	„	9–10, ult. 1 : $3\frac{1}{5}$.	„	$11\frac{1}{2}$	3	$2\frac{2}{3}$	$1\frac{1}{2}$	E. Mexico.
——, var. minor, *v. Mart.*	„	„	„	$8\frac{1}{2}$, ult. 1 : $3\frac{1}{6}$.	„	$5\frac{3}{3}$	$1\frac{1}{3}$	$1\frac{1}{3}$	$\frac{1}{2}$	E. Mexico.
——, var. pittieri, *v. Mart.*	subulato-turrita, apice globoso.	lævis.	„	10, planiusculi, ult. 1 : $3\frac{1}{2}$.	„	8–10	2	$1\frac{2}{3}$	$1\frac{1}{4}$	S.W. Costa Rica.
linearis, *Pfr.*	cylindrico-turrita, apice obtuso.	striis subarcuatis, confertis.	hyalina, tenuissima.	5–7, convexiusculi, ult. 1 : $3\frac{1}{3}$.	ovata, marg. col. modice torto, crasso.	2–$2\frac{3}{4}$	$\frac{1}{2}$–$\frac{3}{4}$	$\frac{2}{3}$	...	E. Mexico.
blandi, *Pfr.*	subfusiformi-turrita.	striis pliciformibus, obsoletis, raris, ad suturam distinctioribus.	pallide albido-cornea, nitidula.	6, planiusculi, ult. 1 : $2\frac{1}{3}$.	oblongo-elliptica, marg. col. distincte torto.	$8\frac{1}{2}$	2	$2\frac{3}{4}$	$1\frac{1}{2}$	E. Mexico.
scalella, *v. Mart.*	conoideo-turrita.	costulis confertis, rectis, tenuibus.	flavescenti-albida, diaphana.	5, perconvexi, ult. 1 : 3.	ovata, subtus angustata, marg. col. modice torto, tenui.	$2\frac{1}{3}$	$\frac{3}{4}$	$\frac{2}{3}$	$\frac{1}{2}$	S.W. Costa Rica.

Spiraxis, Sect. I. Species Torto-plicatæ, Fischer & Crosse, Miss. Scient. Mex., Mollusca, i. pp. 608, 609.

Volutaxis, Strebel, Beitr. Mex. Land- und Süssw.-Conch. v. p. 110 (1882).

Shell turrite, imperforate, vertically striate or ribbed, thin, glossy, whitish or yellow; whorls 5–13, increasing very gradually in diameter, more or less flat; aperture comparatively small, generally only one-fourth or one-fifth of the length of the whole shell; columellar margin spirally twisted, more or less thickened, without notch at the base. Anatomy not yet known. The natural position of this genus is therefore still doubtful. In some respects it comes very near *Opeas*, several species having the spiral twisting of the columellar margin less distinct and the brightness of the surface less conspicuous; but in the majority of them the general aspect is different and well recognizable. Shuttleworth united them with the agnathous *Streptostyla* into one genus, and Strebel says also (*loc. cit.* p. 117) that his *Volutaxis* belongs, according to its anatomy, to the Testacellidæ, but he gives no anatomical description of any of his species.

Geographical distribution: West Indian islands and Central America, passing neither to North nor to South America *.

1. Spiraxis scalariopsis.

Bulimus scalariopsis, Morelet, Test. Noviss. ii. p. 11 (1851)[1]; Pfr. Monogr. Helic. Vivent. iii. p. 395[2].

Spiraxis scalariopsis, Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 609, t. 25. figg. 1, 1 *a*, *b*[3].

Hab. N. Guatemala: Peten, in very thick forests, under decaying trunks of trees (*Morelet* 1–3).

2. Spiraxis sulciferus. (Tab. XVIII. fig. 4.)

Bulimus sulciferus, Morelet, Test. Noviss. ii. p. 12 (1851)[1]; Pfr. Monogr. Helic. Vivent. iii. p. 395[2].

Spiraxis sulciferus, Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 610, t. 25. figg. 2, 2 *a*, *b*[3].

Volutaxis sulciferus, Strebel, Beitr. Mex. Land- und Süssw.-Conch. v. p. 120, t. 7. figg. 10 *a*, 10 *b*, t. 17. fig. 12[4].

Spiraxis euptyctus, Pfr. P. Z. S. 1856, p. 378[5]; Malak. Blätt. iii. p. 232 (1856)[6]; Monogr. Helic. Vivent. iv. p. 574[7]; Fisch. & Crosse, loc. cit. p. 612[8].

Hab. E. Mexico: Rancho de Guerrero, Rancho de San Eligio, and Agua Caliente near Misantla (*Estefania Salas* 4); Mirador (*Berendt* 3).

S.E. Mexico: Palenque, in woods (*Morelet* 1–3); Chiapas (*Ghiesbreght* 5–8).

W. Guatemala: Retalhuleu, in the woods (*Stoll*).

Var. *cobanensis*.

Spiraxis sulciferus, var. *β. cobanensis*, Fisch. & Crosse, loc. cit. pp. 610, 611, t. 25. figg. 3, 3 *a*, *b*[9].

Hab. N. Guatemala: Coban (*Sarg* 9).

* *Spiraxis æquatorius*, Miller, from Ecuador, belongs to *Leptinaria*. *S. incertus*, Mouss., from Colombia, and the East-Indian species referred by Pfeiffer to this genus probably do not belong to it.

According to the observations of Dr. Stoll, the living animal is 8 millim. long, yellowish-grey ; the upper feelers $2\frac{1}{2}$ millim. long, blackish, the lower feelers distinct. It ascends rotten trunks of trees, but needs much moisture.

Var. *berendti*.

Spiraxis berendti, Pfr. Malak. Blätt. ix. p. 97 (1862) [10] ; Monogr. Helic. Vivent. vi. p. 189 [11] ; Fisch. & Crosse, loc. cit. p. 613, t. 25. figg. 4, 4 *a*, *b* [12].

Volutaxis berendti, Strebel, Beitr. Mex. Land- und Süssw.-Conch. v. p. 120, t. 7. fig. 10 [13].

Hab. E. Mexico : Mirador (*Berendt* [10–13], *Sartorius* [13]) ; Cañada grande de Coatepec, near Jalapa [13].

3. **Spiraxis tenuis.**

Spiraxis tenuis, Pfr. Malak. Blätt. xv. p. 84 (1868) [1] ; Monogr. Helic. Vivent. viii. p. 257 [2] ; Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 614, t. 25. figg. 5, 5 *a*, *b* [3] (not full-grown ?).

Hab. E. Mexico : Orizaba (*Sallé* [1–3]).

4. **Spiraxis acus.**

Spiraxis acus, Shuttleworth, in Mittheil. nat. Ges. Bern, 1852, Diagn. neuer Moll. no. 2, p. 27 [1] ; Pfr. Monogr. Helic. Vivent. iii. p. 470 [2] ; Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 614 [3].

Volutaxis acus, Strebel, Beitr. Mex. Land- und Süssw.-Conch. v. p. 125 [4].

Hab. E. Mexico : Cordova (*Jacot-Guillarmod* [1–4]).

Not again found and not recognized by later authors.

Var. *minor*.

Spiraxis acus, var. *minor*, Fisch. & Crosse, loc. cit. p. 614, t. 25. figg. 6, 6 *a*, *b* [5].

Hab. E. Mexico : Orizaba (*Botteri* [5]).

5. **Spiraxis tenuecostatus.**

Volutaxis tenuecostatus, Strebel, Beitr. Mex. Land- und Süssw.-Conch. v. p. 121, t. 17. fig. 11 (1882) [1].

Hab. E. Mexico : Agua Caliente, near Misantla (*Strebel* [1]).

6. **Spiraxis miradorensis.**

Volutaxis miradorensis, Strebel, Beitr. Mex. Land- und Süssw.-Conch. v. p. 122, t. 17. figg. 23 *a*, *b*, and 35 (1882) [1].

Hab. E. Mexico : Mirador (*Strebel* [1]).

7. **Spiraxis similaris.**

Volutaxis similaris, Strebel, Beitr. Mex. Land- und Süssw.-Conch. v. p. 122, t. 7. fig. 11, t. 17. fig. 18 (1882) [1].

Hab. E. Mexico: woods of Pacho near Jalapa (*Estefania Salas* [1]).

8. **Spiraxis confertecostatus.**

Volutaxis confertecostatus, Strebel, Beitr. Mex. Land- und Süssw.-Conch. v. p. 122, t. 7. fig. 12, t. 17. fig. 19 (1882) [1].

Hab. E. Mexico: Pacho and Dos Arroyos near Jalapa (*Estefania Salas* [1]).

9. **Spiraxis intermedius.**

Volutaxis intermedius, Strebel, Beitr. Mex. Land- und Süssw.-Conch. v. p. 123, t. 17. figg. 22, 34 (1882) [1].

Hab. E. Mexico: Pacho near Jalapa (*Strebel* [1]).

10. **Spiraxis confertestriatus.**

Volutaxis confertestriatus, Strebel, Beitr. Mex. Land- und Süssw.-Conch. v. p. 123, t. 17. figg. 21, 33 (1882) [1].

Hab. E. Mexico: Mirador (*Strebel* [1]).

11. **Spiraxis nitidus.**

Volutaxis nitidus, Strebel, Beitr. Mex. Land- und Süssw.-Conch. v. p. 123, t. 7. fig. 9, t. 17. figg. 25, 36 (1882) [1].

Hab. E. Mexico: Pacho and Mirador (*Strebel* [1]).

Var. *major*, n. (Tab. XVIII. fig. 1.)

Long. 10–11½ millim., diam. 2½; apert. 2 long and 1 broad; 9–10 whorls.

Hab. E. Mexico: Las Vigas (*Höge*).

From the form of the aperture it is probable that our figured specimen is not quite full-grown, although of considerably larger size than indicated by Strebel.

Var. *minor*, n.

Volutaxis nitidus, form B, Strebel, loc. cit. p. 124, t. 7. fig. 13, t. 17. fig. 20 [2].

Hab. E. Mexico: Pacho, Camino de Obispo, and Mirador (*Strebel* [2]).

Var. *pittieri*, n. (Tab. XVIII. fig. 2.)

Magis elongatus, lævis; anfr. 10, apice globoso, perobtuso.
Long. 10, diam. 2; apert. long. 1⅔, diam. 1¼ millim.

Hab. S.W. Costa Rica: El Pital, at an elevation of 250 metres above the sea, in the valley of Naranjo, and Savana de Guacimo, at a similar elevation, in the valley of the Rio Brus (*Pittier*).

12. **Spiraxis linearis.**

Spiraxis linearis, Pfr. Malak. Blätt. xiii. p. 84 (1866) [1]; Monogr. Helic. Vivent. vi. p. 193 [2]; Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 616 (t. 25. figg. 7, 7 *a*, *b*?) [3].
Volutaxis linearis, Strebel, Beitr. Mex. Land- und Süssw.-Conch. v. p. 124, t. 12. fig. 10 [4].

Hab. E. Mexico: Vera Cruz, on the beach, under pieces of wood cast ashore (*Strebel and Berendt* [1–4]).

The figure given by Fischer and Crosse is remarkably different from that given by Strebel, which was probably drawn from a not full-grown specimen.

13. **Spiraxis blandi.**

Spiraxis blandi, Crosse & Fisch. Journ. de Conch. xxv. p. 271 (1877) [1]; Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 616, t. 25. figg. 11, 11 *a*, *b* [2].

Hab. E. Mexico: State of Vera Cruz (*coll. Crosse*) [1 2].

14. **Spiraxis scalella,** sp. n. (Tab. XVIII. fig. 5.)

Testa conoideo-turrita, costulis rectis confertis compressis sculpta, flavescenti-albida, diaphana; anfr. 5, regulariter crescentes, infra suturam perconvexi, ultimus basi concaviuscule attenuatus; apertura ovata, subtus angustata, margine columellari modice torto, tenui.
Long. $2\frac{1}{3}$, diam. $\frac{3}{4}$; apert. long. $\frac{2}{3}$, diam. $\frac{1}{2}$ millim.

Hab. S.W. Costa Rica: El Pital, at an elevation of 250 metres above the sea, in the valley of the Rio Naranjo (*Pittier*).

In the very convex whorls this species resembles *S. scalariopsis*, and it might also be compared with a *Scalaria*, but the costæ are much more numerous and more feeble. As I have seen only one specimen, and the number of the whorls is rather few for this genus, it may perhaps be not full-grown, but I know no other species to which it could be referred.

TORNAXIS, gen. nov.

Shell turrite, imperforate, vertically costulated, not shining, many-whorled, not keeled; aperture ovate, external margin simple, arcuate; columellar margin very thick, strongly twisted, separated by a deep and narrow notch from the basal margin. Anatomy not yet known.

This genus possesses to a certain extent the characters of both *Subulina* and *Spiraxis* as regards the form of the aperture, but in its general aspect it approaches nearer to *Rhodea*, H. & A. Adams, from which it only differs in the absence of the prominent spiral keel in the terminal whorls.

Named from *axis*, and *tornare*, to turn on a lathe; analogous to *Spiraxis*.

1. **Tornaxis singularis,** sp. n. (Tab. XVIII. fig. 6.)

Shell cylindrically turrite, rather solid, with vertical narrow costæ, separated by interstices which are from two to four times as broad as the costæ, of dull greyish colour. Whorls very convex, with simple linear sutures, six in number in the only specimen obtained, which is broken above (there are, no doubt, considerably more in perfect examples); last whorl rounded in the periphery, somewhat concavely attenuated and produced at the base. Aperture distinctly oblique, asymmetrically ovate, acute above,

regularly arcuated at the outer side, sinuous in the form of an **S** on the columellar side, rounded at the base; external margin thin, simple, arcuate; columellar margin formed by a strong, thick, white, spirally twisted line, which enters above into the interior of the aperture, and is terminated at the base by a vertical narrow notch.

Length (of the injured shell) 11 millim., diam. including the aperture 3, diam. of the penultimate whorl $2\frac{1}{2}$; aperture $2\frac{1}{2}$ millim. long, $1\frac{1}{2}$ broad. Last whorl, seen from the dorsal side, one-third of the length of the six preserved whorls united.

Hab. E. GUATEMALA: Panzos (*Conradt*).

In the unique specimen the costæ are rubbed down here and there, and the hole of the upper breach is open, which proves that the upper whorls have not been lost during life.

LEPTINARIA.

Achatina, subgen. *Leptinaria,* Beck, Ind. Moll. p. 37 (1837).
Bulimus, subgen. *Nothus,* Albers, Die Helic. ed. 1, p. 168 (1850) [preoccupied in Coleoptera by Olivier (1811) and in Lepidoptera by Billberg (1820)].
Leptinaria, Shuttleworth, in Mittheil. nat. Ges. Bern, 1854, Diagn. neuer Moll. no. 6, p. 144.
Cionella, subgen. *Leptinaria,* v. Martens, in Albers's Die Helic. ed. 2, p. 254.
Lamellaxis, Strebel, Beitr. Mex. Land- und Süssw.-Conch. v. p. 109 (1882).

Shell ovate or oblong, mostly perforate or umbilicate, thin, semipellucid, whitish, with feeble vertical striæ; whorls 5–8, rather convex, increasing considerably in diameter (much more than in *Opeas* and *Subulina*); aperture oval or oblong; columellar margin distinctly twisted and notched near the base of the aperture in the form of a more or less distinct fold or tooth, mostly expanded outwards and covering a part of the perforation. In some species (Group B) an additional fold or spiral plate on the upper wall of the aperture (parietal plate).

Jaw thin, somewhat arcuate, with fine vertical striæ. Teeth of the radula in straight transverse rows, the median tooth very small, the lateral ones tricuspidate. See Fischer and Crosse, Journ. de Conch. v. p. 241 (1857), and Miss. Scient. Mex., Mollusca, i. p. 622; Gibbons, in Binney's "Notes on the Jaw and Lingual Dentition of Pulmonata" (Ann. Lyc. N. York, iii. p. 101). Anatomy of the genital organs not yet known. Some species are said to be viviparous, but in others there are to be seen globular eggs of rather large size (Tab. XVIII. fig. 7), resembling those of *Subulina.*

A generic distinction between those with and those without parietal plate cannot be maintained, because in some species this plate is very conspicuous in young shells and disappears nearly or entirely in full-grown ones, as, for instance, in *L. stolli*; in others it is not seen in young shells, but well in full-grown ones, as in *L. emmelinæ.*

The species of this genus are very closely allied and difficult to determine. In many cases it is almost impossible to say whether a specimen is full-grown or young. The comparative differences, too, in the general outlines, in the strength of the sculpture, and in the shape of the columellar margin (inner edge of the aperture) are very gradual, and it may well be doubted if the various authors, including myself, mean the same when speaking of strong or fine costæ, of striæ, &c., and in describing

the columellar margin as twisted or toothed. Strebel has included in the same species shells of very different outlines, according to his figures, and I am compelled to follow him, having seen very few Mexican specimens. On the other hand, through the kindness of Mr. H. Pittier and Mr. P. Biolley, there are before me many specimens from Costa Rica, but only a few of them can be identified as belonging to described species. As regards the columellar margin, it may be twisted as a whole (marg. columellaris tortus), or may have its chief part straight and only the inward edge transformed into a spiral fold, separated by a slight depression from the main part (marg. col. plica circumvolutus); in either case, the under edge of the twisted portion projects more or less distinctly in the shape of a tooth (dentatus). But in the descriptions of the various authors this difference is often not clearly stated; the term "marg. col. plicatus" (folded) applying to both.

In the comparative table I am obliged, however, to use the terms applied by the authors themselves in their descriptions for all the species of which I have no specimens or figures before me; in some cases, therefore, the differences given may be more apparent than real.

This genus is represented in the West-Indian Islands, in Central America, Colombia, Venezuela, Ecuador, Bolivia, Peru, and Brazil, but is absent from the United States of North America. The most northern species are, so far as I know, *L. mexicana*, Pfr., from Misantla, Mexico, and *L. paludinoides*, d'Orb., from Cuba; the most southern an undetermined form found by H. v. Ihering at Taguara del Mondo Novo, in the province of Rio Grande do Sul, Brazil. Within our limits the species are distributed as follows:—

	Group A.	Group B.
East Mexico:	*L. mexicana* and vars. *turrita* and *abbreviata*, *L. martensi* and var. *inflata*, *L. imperforata*.	
South-east Mexico (Tabasco):	*L. exigua*.	
North Guatemala:	*L. guatemalensis*.	*L. elisæ*, *L. emmelinæ*.
West Guatemala:	*L. guatemalensis*, *L. stolli*.	
East Guatemala:	*L. filicostata*.	
Honduras:	*L. mexicana*, *L. filicostata*, *L. simpsoni*, *L. fordiana*.	
Central Nicaragua:	*L. sinistra*.	
East Nicaragua:	*L. hyalina*.	
North-west Costa Rica:	*L. guatemalensis*, var. *majuscula*.	
North-east Costa Rica:	*L. ambigua*.	*L. solida*.
Central Costa Rica:	*L. ambigua*, *L. pittieri* and var. *obliquata*, *L. guatemalensis*, var. *majuscula*, *L. biolleyi*, *L. costaricana*.	*L. convoluta*.
East Costa Rica:	*L. pittieri*, *L. crenulata*, *L. biolleyi*.	
South-east Costa Rica:	*L. interstriata*.	
South-west Costa Rica:	*L. pittieri*, *L. interstriata*, *L. guatemalensis*, var. *majuscula*, *L. costaricana*, *L. hapaloides*.	*L. solida*, *L. convoluta*.
North Panama:	*L. interstriata*.	

Comparative Table of the Species of *Leptinaria*.

A.—Paries aperturalis inermis.

Nomen.	Forma.	Sculptura.	Anfractus.	Umbilicus.	Margo columellaris.	Long.	Diam.	Apert.	Patria.
mexicana, *Pfr.*	oblongo-conoidea vel ovato-conoidea.	subdistanter pliculosa, plicis abbreviatis.	6½–7, sat convexi, ult. 1 : 2.	angustus vel rimatus.	modice dentatus, plus minusve dilatatus.	mm. 7–8½	mm. 3–3½	mm. 2½–3	E. Mexico, Honduras.
——, var. turrita, *v. Mart.* ...	oblongo-turrita.	,,	7–7½, perconvexi, ult. 1 : 2⅓.	,,	,,	9–9⅔	3⅓–3½	3–3⅓	E. Mexico.
——, var. abbreviata, *v. Mart.*	ovata.	,,	6½–7, sat convexi, ult. 1 : 1⅔.	,,	,,	7	4½	3	E. Mexico.
martensi, *Pfr.*	ovato-conoidea.	distanter chordato-costulata.	6, sat convexi, ult. 1 : 2.	angustus.	,,	8–9½	2½–4½	3¼–4	E. Mexico.
——, var. inflata, *v. Mart.* ...	inflato-conoidea.	,,	3¾, sat convexi, ult. 1 : 1¾.	,,	,,	7½–8	3½	3⅔–4	E. Mexico.
stolli, *v. Mart.*	ovato-globosa.	striatula.	5, ult. 1 : 1½.	rimatus.	latus, subconcavus, plica circumvolutus.	7	5	4½	W. Guatemala.
pittieri, *v. Mart.*	conoideo-ovata.	æqualiter subtiliter striata.	6½, planiusculi, ult. 1 : 2.	perforatus.	latus, rectus, plica circumvolutus.	8½–10½	5–8	4–5½	Centr., E., & S.W. Costa Rica.
——, var. obliquata, *v. Mart.*	,,	,,	,,	,,	latus, obliquus, plica circumvolutus.	10	6	5	Centr. Costa Rica.
hyalina, *Tate*	ovato-conoidea ?	costulata ?	?, ult. 1 : 2 ?	?	modice dentatus ?	5¾	3¾	?	E. Nicaragua.
exigua, *v. Mart.*	ovata.	tenuissime striatula.	5, sat convexi, ult. 1 : 1⅔.	perforatus.	dilatatus, leviter tortus.	5	3	3	S.E. Mexico.
interstriata, *Tate*	conoidea.	arcuatim costulata, interstitiis tristriatis.	7–8, convexi, ult. 1 : 1½.	rimatus.	modice dentatus.	7–8	3	2⅔	S.W. & S.E. Costa Rica, N. Panama.
crenulata, *v. Mart.*	acute ovata.	subdistanter costulata, anfr. ult. sublævi.	6, gradati, ult. 1 : 2.	,,	latus, paulum concavus, plica circumvolutus.	11	6	5	E. Costa Rica.
sinistra, *v. Mart.*	conoidea, sinistrorsa.	striatula.	6, convexiusculi, ult. 1 : 1½.	apertus.	leviter dilatatus, obsolete denticulatus.	4	2	1½	Centr. Nicaragua.

guatemalensis, *Cr. & F.*	oblongo-conoidea.	plicato-costulata.	6, convexi, ult. 1 : 2.	subperforatus.	leviter dentato-tortus.	5½	2½	2	N. & W. Guatemala.
——, var. majuscula, *v. Mart.*	,,	,,	,,	,,	fortius dentato-tortus.	7–7½	3 3½	2⅔–3½	N.W., Centr., and S.W. Costa Rica.
filicostata, *Streb.*	,,	confertim argute costulata.	6–6¾, sat convexi, ult. 1 : 2⅔.	perforatus.	callose dentatus.	7–8	3	2⅔	E. Guatemala, Honduras.
biolleyi, *v. Mart.*	,,	leviter costulata.	6, convexiusculi, ult. 1 : 2¼.	rimatus.	peroblique truncatus, plica tenui circumvolutus.	6–7	3	3	Centr. & E. Costa Rica.
simpsoni, *Anc.*	oblongo-conica.	subarcuatim striatula.	6½, convexiusculi.	plane obtectus.	validus intorto-truncatus.	9	4½	3½	Honduras.
fordiana, *Anc.*	subturrito-ovata.	arcuatim obsolete striatula.	5½, convexi, ult. 1 : 2?	,,	valde intortus, leviter truncatus.	6¾	3⅔	3⅓	Honduras.
costaricana, *v. Mart.*	ovato-oblonga, subturrita.	striatula.	6–7, convexiusculi, ult. 1 : 2¼–2½.	rimatus.	oblique truncatus, plica angusta circumvolutus.	6–9	3–4	3–4	Centr. & S.W. Costa Rica.
imperforata, *Streb.*	oblongo-turrita.	confertim plicata.	7–8, convexiusculi, ult. 1 : 2⅔.	plane obtectus.	valde dentatus.	11½–13	4½–4⅘	3½–4	E. Mexico.
hapaloides, *v. Mart.*	turrita.	subarcuatim plicatula.	8, sat convexi, ult. 1 : 2½.	perforatus.	distincte dentatus et tortus, basi crassiusculus.	11	4	3¾	S.W. Costa Rica.
ambigua, *v. Mart.*.....	oblongo-turrita.	æqualiter striatula.	7, planiusculi, ult. 1 : 2⅓-2½.	latiuscule rimatus.	oblique truncatus, plica gracili circumvolutus.	9–10	3½–4	3–3¼	N.E. & Centr. Costa Rica.

B.—Paries aperturalis plicato-dentatus.

Nomen.	Forma.	Sculptura.	Coloratio.	Anfractus.	Umbilicus.	Margo columellaris.	Long.	Diam.	Apert.	Patria.
							mm.	mm.	mm.	
solida, *v. Mart.*	conoideo-ovata.	subdistanter costulata.	albida.	6½, paulum convexi, ult. 1 : 1⅘.	semiaperte perforatus.	crassus, plica valida circumvolutus.	9½–12	5–6⅔	4½–6	N.E. & S.W. Costa Rica.
elisæ, *Tristr.*	conico-ovata.	delicatissime striatula.	semipellucida (flavescens).	7–8, convexi, ult. 1 : 1⅔.	rimatus vel clausus.	crassus, valide tortus et dentatus.	9–10½	5–6	5	N. Guatemala.
convoluta, *v. Mart.*	,,	subtiliter striatula, anfr. supp. dist. costulatis.	grisea.	6, modice convexi, ult. 1 : 1¾.	imperforatus.	subverticalis, late truncatus, introrsum convolutus et plica circumvolutus.	7	4½–5	4	Centr. & S.W. Costa Rica.
emmelinæ, *Tristr.*	elongata.	vix striatula.	nitida.	7–8, convexi, 1 : 2?	perforatus.	(crassus?) plica circumvolutus.	15	5	?	N. Guatemala.

A. Species without parietal plate.

Achatina, part., Pfeiffer (1848); *Nothus*, Albers (1850); *Spiraxis*, § 3, Pfeiffer (1877); *Spiraxis*, sect. II. Species Dentato-plicatæ, Fischer & Crosse (1877); *Lamellaxis*, Strebel (1882).

1. **Leptinaria mexicana.**

Spiraxis mexicana, Pfr. Malak. Blätt. xiii. p. 84 (1866) [1]; Monogr. Helic. Vivent. vi. p. 193 [2].
Spiraxis mexicanus, Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 617 [3].
Lamellaxis mexicanus, Strebel, Beitr. Mex. Land- und Süssw.-Conch. v. p. 109, t. 7. fig. 14 *b*, t. 17. fig. 3 [4].
Nothus mexicanus, Ancey, Ann. Malac. 1886, p. 247 [5].

Hab. E. Mexico: Mirador (*Berendt* [1–3], *Strebel* [4]); Rancho Guerrero, Agua Caliente, Camino de Obispo, Camino de Arroyo Rondo, and Rancho de San Eligio, all near Misantla, and the further Cañada de Coatepec near Jalapa (*Strebel* [4]); Misantla (*Höge*).
Honduras: Utila Island (*Simpson* [5]).

Var. *turrita*, n.
Lamellaxis mexicanus (part.), Strebel, loc. cit. p. 111, t. 7. fig. 14 *a*, t. 17. figg. 3 *a*, *b*, *c* (right figure) [6].
Hab. E. Mexico: Agua Caliente (*Strebel* [6]); Misantla (*Strebel* [6], *Höge*).

Var. *abbreviata*, n.
Spiraxis mexicana (part.), Fisch. & Crosse, loc. cit. p. 617, t. 25. figg. 8, 8 *a*, b [7].
Lamellaxis mexicana (part.), Strebel, loc. cit. p. 111, t. 17. fig. 3 *c* (left figure) [8].
Hab. E. Mexico: Mirador (*Berendt* [7]); Agua Caliente near Misantla (*Stebel* [8]).

2. **Leptinaria martensi.**

Bulimus martensi, Pfr. P. Z. S. 1856, p. 318 [1]; Monogr. Helic. Vivent. iv. p. 451 [2].
Spiraxis martensi, Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 619, t. 25. figg. 9, 9 *a*, *b* [3].
Lamellaxis modestus, form B, Strebel, Beitr. Mex. Land- und Süssw.-Conch. v. p. 112, t. 7. fig. 15, t. 17. figg. 5 *a*, 5 *b* (left figure), 6 *a*, 7 *b* (1882) [4].

Hab. E. Mexico: Cordova (*Sallé* [1–3]); Mirador (*Berendt* [3], *Strebel* [4]).

Var. *inflata*, n.
Lamellaxis modestus, form A, Strebel, loc. cit. p. 112, t. 7. fig. 15 *a*, t. 17. fig. 5 *b* (right figure) [5].
Hab. E. Mexico: Misantla (*Strebel* [5]).

3. **Leptinaria stolli**, sp. n. (Tab. XVIII. figg. 9, 9 *a*.)

Testa ovato-globosa, rimata, tenuis, leviter striatula, pallide flavescens, nitidula; anfr. 5, convexi, sutura modice impressa, ultimus basi rotundatus. Apertura subverticalis, trapezoidea, margine externo bene arcuato, basali late rotundato; margo columellaris paululum concavus, dilatatus, prope basin late truncatus et plica distincta circumvolutus; paries aperturalis in testa juvenili uniplicatus.
Long. 7, diam. 5; apert. long. $4\frac{1}{2}$, diam. 3 millim.
Last whorl, seen from the dorsal side, to the whole length of the shell as $1 : 1\frac{1}{2}$ or 5 : 8.

Hab. W. Guatemala: Retalhuleu, in woods, under decayed leaves, rare (*Stoll*).

The most globose of all the species within our limits. A young shell (fig. 9 *a*), quite distinct by its form from *L. elisæ*, shows the parietal plate very clearly; but in the full-grown examples no trace of it is to be seen.

Dr. O. Stoll describes the living animal as follows:—"Animal pale grey; anterior part of the body much more strongly developed than the shortened hinder part; upper feelers nearly cylindrical; lower feelers forming only a short protuberance." A sketch drawn by him from the living animal is reproduced on our Plate (fig. 9), but the outlines of the shell are drawn directly from one of his specimens.

4. **Leptinaria pittieri,** sp. n. (Tab. XVIII. fig. 7.)

Testa conoideo-ovata, apice papillari, perforata, tenuis, subpellucida, æqualiter subtiliter striata, griseo-albida vel flavescenti-albida; anfr. 6–6½, planiusculi, sutura sat impressa, subgradata, ultimus basi bene rotundatus. Apertura subverticalis, trapezoideo-piriformis, margine externo superne vix arcuato, paululum arcuatim producto, margine basali late rotundato; margo columellaris subverticalis, latus, prope basin subito attenuatus, plica spirali distincta lamelliformi tenui circumvolutus; paries aperturalis callo tenuissimo vix distincto.

Long. 10½, diam. 8; apert. long. 5½, lat. 3 millim.
„ 9½, „ 6; „ 5, „ 3 „
„ 8½, „ 5; „ 4, „ 2½ „

Last whorl, seen from the dorsal side, to the whole length of the shell as 1 : 2.

Hab. Central Costa Rica: La Palma, at an elevation of 1500–1600 metres above the sea, beneath cactoids (*Biolley*, 1895; *Pittier*, 1897); San Francisco de Guadalupe, under hedges (*Pittier*, 1897); La Uruca, 1100 metres, in the environs of San José, on the ground among moss (*Biolley*, Aug. 1891); Santa Clara, 200 metres above the sea, and Alajuelita, 1200 metres (*Biolley*).

E. Costa Rica: Valley of Juquin, near Talamanca (*Pittier*, March 1894).

S.W. Costa Rica: middle course of the Rio Pacuare del Sur (*Pittier*, Dec. 1891).

Width of the perforation somewhat variable. In the specimen from Santa Clara are six calcareous white eggs of globular form, 1·7–1·8 millim. in diameter.

Var. *obliquata*, n. (Tab. XVIII. fig. 8.)

Differt margine columellari oblique deorsum et extrorsum porrecto, plica dentiformi.

Long. 10, diam. 6; apert. long. 5, diam. 3 millim. Last whorl, seen from the dorsal side, as 1 : 2.

Hab. Central Costa Rica: Tarbaca, at an elevation of 1700 metres above the sea (*Biolley*).

5. **Leptinaria hyalina.**

Tornatellina hyalina, Tate, Amer. Journ. of Conch. v. p. 157 (1870) [1]; Pfr. Monogr. Helic. Vivent. viii. p. 259 [2].

Hab. E. Nicaragua: Toro Rapids of the river San Juan (*Tate* [1 2]).

Very imperfectly described and not figured. Perhaps identical with my *L. pittieri*.

6. **Leptinaria exigua,** sp. n. (Tab. XVIII. fig. 10.)

Testa ovata, perforata, tenuis, levissime striatula, nitidula, pellucida, plus minusve albo-variegata; anfr. 5, sat convexi, sutura compressa, superiores distincte costulati, ultimus versus basin bene rotundatus. Apertura modice obliqua, trapezoideo-piriformis, margine exteriore modice arcuato, non arcuatim producto, basali subanguste rotundato; margo columellaris superne late dilatatus, versus basin angustatus, leviter tortus; paries aperturalis callo nullo.

Long. 5, diam. 3; apert. long. 3, diam. 2 millim.

Last whorl, seen from the dorsal side, to the whole length of the shell as 1 : $1\frac{2}{3}$.

Hab. S.E. Mexico: Teapa in Tabasco (*H. H. Smith*).

Distinct from *L. guatemalensis*, Cr. & Fisch., and from *L. martensi*, var. *inflata*, by the want of costæ on the last whorl and by the size. Both the sculpture and the columellar fold are very feebly developed, but the general appearance of the shell is that of a true *Leptinaria*. The two specimens seen are of equal size. The whorl before the last in one of them is distinctly costate, in the other with obsolete costæ. Both shells have somewhat the aspect of not being full-grown, but I know no other species to which they could be attributed as a young state.

7. **Leptinaria interstriata.**

Tornatellina interstriata, Tate, Amer. Journ. Conch. v. p. 957, t. 16. fig. 3 (1869–70)[1]; Pfr. Monogr. Helic. Vivent. viii. p. 259[2].

Leptinaria interstriata, Angas, P. Z. S. 1879, p. 485[3].

Hab. S.W. Costa Rica: on burned soil in the plains of the Rio Grande of Terraba, 20 metres above the sea (*Pittier*, April 1892: one specimen).

S.E. Costa Rica: without nearer indication of locality (*Gabb*[3]).

N. Panama: Boca del Toro, on an island in the lagoon of Boca del Toro, in the forest (*Tate*[1 2]).

Distinct by its conoidal form and well-defined costæ.

8. **Leptinaria crenulata,** sp. n. (Tab. XVIII. fig. 12.)

Testa acute ovata, rimato-perforata, solidula, costulis subdistantibus membranaceis, in anfractu ultimo evanescentibus et striis subtilibus interjacentibus sculpta, flavescenti-albida, nitidula; anfr. 6, planiusculi, *sutura angulo limbata* et *subtiliter* crenulata, ultimus basi sat tumidus. Apertura paulum obliqua, ovata, margine externo leviter arcuatim producto, basali latiuscule rotundato; margo columellaris in parte tertia inferiore tenuis, verticaliter ascendens, in partibus 2 superioribus latus, paulum concavus et plica tenui distincta spirali circumvolutus, non dentatus; paries aperturalis callo tenui supra emarginato tectus.

Long. 11, diam. 6; apert. long. 5, diam. 3 millim.

Last whorl, seen from the dorsal side, is to the whole length of the shell as 1 : 2.

Hab. E. Costa Rica: Uren, near Talamanca (*Pittier*, March 1895).

The angular line bordering the suture is distinctly visible when the shell is viewed in certain positions, but in others it appears only as a sudden change in the convexity; it is more distinct in the last whorl. The crenulation or indentation of the suture is rather faint. I have seen only one specimen, which shows, at some distance behind the

aperture, two slightly thickened and more darkly coloured interruptions of growth (varices), proving that it is a full-grown individual.

9. **Leptinaria sinistra,** sp. n. (Tab. XVIII. fig. 11.)

Testa conoidea, aperte perforata, verticaliter striatula, pallide griseo-flavidula, diaphana, tenera; anfr. 6, convexiusculi, ultimus rotundatus, basi convexus, lævis; apertura verticalis, rhombea, margine externo convexiusculo, margine basali extrorsum ascendente, margine columellari parum obliquo, supra leviter dilatato et reflexo, medio obsolete denticulato.

Long. 4, diam. 2; apert. long. $1\frac{1}{2}$, lat. 3 millim.

Last whorl, seen from the dorsal side, to the whole length of the shell as $1 : 2\frac{1}{2}$.

Hab. Central Nicaragua: Acoyapa, on the north side of the lake of Nicaragua (*Belt*, Dec. 1879).

Distinct from all others of the genus by the sinistral whorls; only one specimen was found. The quadrangular form of the aperture and the very feeble development of the columellar tooth are perhaps due to the shell not being full-grown.

10. **Leptinaria guatemalensis.**

Spiraxis guatemalensis, Crosse & Fisch. Journ. de Conch. xxv. p. 271 (1877)[1]; Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 618, t. 25. figg. 10, 10 *a*, *b*[2].

Hab. N. Guatemala: Coban (*Sarg* [1 2]).

W. Guatemala: Retalhuleu, in a wood, under decayed leaves (*Stoll*: one young specimen).

Var. *majuscula*, n. (Tab. XVIII. fig. 13.)

Larger and with a stronger columellar fold.

Long. $7–7\frac{1}{2}$, diam. $3–3\frac{1}{2}$; apert. long. $2\frac{2}{3}–3\frac{1}{2}$, diam. 2 millim.

Hab. N.W. Costa Rica: Guanacaste (*Pittier*).

Central Costa Rica: San José (*Pittier*).

S.W. Costa Rica: Valley of the Rio Grande de Terraba, 30 metres above the sea, at the roots of large trees in the wood of Palmar (*Pittier*, March 1892); Golfo Dulce (*Pittier*: young specimen).

11. **Leptinaria filicostata.**

Lamellaxis filicostatus, Strebel, Beitr. Mex. Land- und Süssw.-Conch. v. p. 113, t. 17. fig. 10 (1882)[1].

Hab. E. Guatemala: San Miguel Jucume * (*Starck* [1]).

Honduras: Copan, near the frontier of Guatemala (ex *H. v. Ihering*).

12. **Leptinaria biolleyi,** sp. n. (Tab. XVIII. fig. 14.)

Testa oblongo-conoidea, rimata, tenuis, leviter costulata, flavescens vel albida, diaphana; anfr. 6, convexiusculi, sutura modice impressa, ultimus subtus modice rotundatus. Apertura subverticalis, oblique piriformis,

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* Probably San Miguel Turucu in the Polochic Valley.

margine externo regulariter arcuato, antrorsum convexo, basali anguste rotundato; margo columellaris verticalis, peroblique truncatus et plica tenui gracili circumvolutus; paries aperturalis inermis.

Long. 6–7, diam. 3; apert. long. 3, diam. 2 millim.

Last whorl, seen from the dorsal side, to the whole length of the shell as $1 : 2\frac{1}{4}$.

Hab. Central Costa Rica: environs of San José, 1135 metres above the sea, among moss (*Biolley*).

E. Costa Rica: Talamanca (*Pittier*, March 1895).

Allied to *L. salleana*, Pfr., from Haiti (Strebel, Beitr. Mex. Land- und Süssw.-Conch. v. t. 17. fig. 4), but with more feeble columellar margin.

13. **Leptinaria simpsoni.**

Nothus simpsoni, Ancey, Ann. de Malac. 1886, p. 245 [1].

Hab. Honduras: Utila Island (*Simpson* [1]).

14. **Leptinaria fordiana.**

Nothus fordianus, Ancey, Ann. de Malac. 1886, p. 248 [1].

Hab. Honduras: Utila Island (*Simpson* [1]).

15. **Leptinaria costaricana,** sp. n. (Tab. XVIII. fig. 15.)

Testa ovato-oblonga, subturrita, rimata, solidula, striatula, nitida, pallide flavescens; anfr. 6–7, convexiusculi, regulariter crescentes, sutura modice impressa, subgradata, ultimus basi sensim attenuatus. Apertura paululum obliqua, trapezoidea, margine externo subrecto, basali late rotundato; margo columellaris oblique truncatus, verticaliter ascendens, plica spirali angusta intrante circumvolutus; paries aperturalis inermis.

Long. 9, diam. 4; apert. long. 3–4 millim.
„ 6–7, „ 3; „ 3 „

Last whorl, seen from the dorsal side, to the whole length of the shell as $1 : 2\frac{1}{4}$–$2\frac{1}{2}$.

Hab. Central Costa Rica: San José (*Pittier*, 1893; *Biolley*, 1895).

S.W. Costa Rica: Terraba, especially on burned soil, in the woods of the plain of Terraba (*Pittier*, April 1892); El Pital, in the valley of Rio Naranjo, at an elevation of 200 metres above the sea (*Madame Pittier*, March 1893); plain of the Rio Corredor, in the region of the Golfo Dulce (*Pittier*, 1897); Quebrada de Java, valley of the Rio Brus, 900 metres above the sea, among vegetable detritus, and at the thermal springs of Djiri Durunia, in the same valley (*Pittier*, 1897); valley of the Rio Diquis (*Pittier*, March 1893).

Allied to *L. mexicana*, but of larger size, with comparatively greater diameter of the last whorl and fainter sculpture.

16. **Leptinaria imperforata.**

Lamellaxis imperforatus, Strebel, Beitr. Mex. Land- und Süssw.-Conch. v. p. 113, t. 7. fig. 14 C, and t. 17. fig. 2 (1882) [1].

Hab. E. Mexico: Jalapa, on a strawberry-plant (*Estefania Salas* [1]).

17. **Leptinaria hapaloides,** sp. n. (Tab. XVIII. fig. 16.)

Testa turrita, perforata, solidula, subarcuatim leviter plicatula, nitidula, alba; anfr. 8, sat convexi, sutura gradata, ultimus basi bene rotundatus. Apertura leviter obliqua, trapezoideo-piriformis, margine externo superne et inferne arcuato, medio stricto, distincte arcuatim producto, margine basali subanguste rotundato; margo columellaris basi crassiusculus, arcuatus, medio distincte tortus et dentatus, superne crassus, dilatatus, leviter concavus; paries columellaris callo fere nullo.

Long. 11, diam. 4; apert. long. $3\frac{3}{4}$, lat. $2\frac{1}{3}$ millim.

Last whorl, seen from the dorsal side, to the whole length of the shell as $1 : 2\frac{1}{2}$.

Hab. S.W. Costa Rica: on burned soil, on the plains of the Rio Grande de Terraba, at an elevation of 20 metres above the sea (*Pittier*, April 1892).

Very distinct on account of the elongated form and the arcuated folds.

18. **Leptinaria ambigua,** sp. n. (Tab. XVIII. fig. 17.)

Testa oblongo-turrita, latiuscule rimata, leviter et æqualiter striatula, nitidula, pallide flavescens, apice obtusa; anfr. 7, planiusculi, æqualiter et lente crescentes, sutura modice impressa, ultimus basi convexe attenuatus. Apertura paulum obliqua, piriformis, margine externo leviter arcuato, vix antrorsum convexo, basali anguste rotundato; margo columellaris basi oblique truncatus et plica tenui gracili spirali circumvolutus, dein concaviusculus, supra leviter dilatatus et appressus; paries aperturalis leviter callosus, inermis.

Long. 11, diam. $3\frac{3}{4}$–4; apert. long. $3\frac{1}{4}$, lat. 2 millim.
„ 10, „ $3\frac{1}{2}$; „ 3, „ 2 „
„ 9, „ 4; „ 3, „ 2 „

Length of the last whorl, seen from the dorsal side, to the whole length of the shell as $1 : 2\frac{1}{3}$–$2\frac{1}{2}$. The dimensions of an apparently young specimen from the same locality are—long. 1, diam. 4; apert. long. 3, lat. 2; last whorl $1 : 2\frac{1}{3}$.

Hab. N.E. Costa Rica: Puerto Viejo, at the confluence of the river of this name with the Sarapiqui (*Biolley*, 1893).

Central Costa Rica: La Palma (*Pittier*).

This species, at first sight, more resembles an *Opeas* than a *Leptinaria*, on account of its general form and the want of prominent costæ; the columellar margin, however, is not only obliquely notched, but has a slender spiral fold twisted round its lowest part and clearly separated from it by a slender furrow. This fold is also very much nearer the base of the aperture than in the other species of *Leptinaria*.

Note.—*Spiraxis dubia*, Pfeiffer, already mentioned by me, *anteà*, p. 90, and figured on Tab. V. fig. 10, may perhaps be more nearly allied to *Leptinaria* than to *Streptostyla*.

B. Species with a parietal plate or tooth.

Tornatellina (part.), Pfeiffer (1848); *Tornatellina*, A. *Leptinaria*, Pfeiffer (1877); *Leptinaria*, Fischer & Crosse (1877).

19. **Leptinaria solida,** sp. n. (Tab. XVIII. fig. 18.)

Testa conoideo-ovata, semiaperte perforata, sat solida, subtiliter striatula et costulis membranaceis subdistantibus plus minusve caducis ornata, nitidula, albida; anfr. $6\frac{1}{2}$, superiores paulum convexi, sutura distincta, subgradata, ultimus basi magis convexus, subsaccatus. Apertura parum obliqua, trapezoidea,

margine externo antrorsum convexe producto, basali bene rotundato; margo columellaris crassus, verticaliter ascendens, plica valida lamelliformi intrante in inferiore parte circumvolutus, supra dilatatus; paries aperturalis callo lato et in hujus media parte plica gracili spirali præditus.

Long. 12, diam. $6\frac{2}{3}$; apert. long. 6, lat. 6 millim.
„ 11, „ 6; „ $5\frac{1}{2}$, „ $3\frac{1}{2}$ „
„ 10, „ $5\frac{1}{2}$; „ $4\frac{1}{2}$, „ 3 „
„ $9\frac{1}{2}$, „ 5; „ 5, „ 3 „

The diameter of the aperture includes the columellar margin.

Last whorl, seen from the dorsal side, to the whole length of the shell about as $1 : 1\frac{4}{5}$.

Hab. N.E. Costa Rica: Puerto Viejo, at the confluence of the river of the same name and the Sarapiqui (*Biolley*, 1893).

S.W. Costa Rica: Alto de Mano Tigre, near Terraba, at an elevation of 690 metres above the sea (*Pittier*).

20. **Leptinaria elisæ**, sp. n. (Tab. XVIII. fig. 19.)

Leptinaria elisæ, Tristr. P. Z. S. 1861, p. 231 [1]; Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 625 [2].

Tornatellina elisæ, Pfr. Monogr. Helic. Vivent. vi. p. 263 [3].

Hab. N. Guatemala: Coban (*Salvin* [1–3]).

The two specimens of this species sent for examination by Mr. Salvin have the shell moderately thin, imperforate, nearly smooth, ovate, pale yellowish, the whorl before the last rather large, the last seen from the dorsal side being to the rest of the length of the shell as $1 : \frac{2}{3}$. The columellar margin is much arcuated beneath, thick and strongly twisted above, the twisting ending towards the underside in a strong projection. The tooth on the parietal wall is compressed, lamelliform, almost equally distant from the columella and from the outer margin, and does not reach far into the interior of the aperture. The dimensions of the two specimens are:—

Long. $9\frac{1}{2}$, diam. 5 ?; apert. long. $5\frac{1}{2}$, lat. 3 ? millim.
„ 8, „ $4\frac{3}{4}$; „ 4, „ 3 „

In the larger example a part of the outer wall of the aperture is broken away, therefore the diameter both of the whole shell and of the aperture must have been greater when entire. The other specimen possesses an equally developed tooth or plate on the parietal wall; it is probably also full-grown. In neither shell can I see what Canon Tristram meant by the words "margine dextro sulcato"; but as he gives the length as $10\frac{1}{2}$ and the diameter as 6 millim., he seems to have had a larger specimen than ours.

21. **Leptinaria convoluta**, sp. n. (Tab. XVIII. figg. 20, 20 *a*.)

Testa conico-ovata, imperforata, diaphana, subtiliter striatula, costulis nonnullis sparsis membranaceis in anfr. superioribus ornata, nitida, grisea; anfr. 6, modice convexi, sutura simplice modice profunda, ultimus basi valde rotundatus. Apertura subverticalis, emarginato-ovata, margine externo arcuatim producto, basali breviuscule rotundatus; margo columellaris infra late truncatus, introrsum convolutus, subverticalis,

supra non dilatatus; paries aperturalis callo tenuissimo et in ejus medio plica spirali gracili profunde intrante circumvolutus.

Long. 7, diam. $4\frac{1}{2}$–5; apert. long. 4, lat. $2\frac{1}{2}$ millim.

Last whorl, seen from the dorsal side, to the whole length of the shell as $1 : 1\frac{3}{4}$.

Hab. Central Costa Rica: Santa Clara, at an elevation of 200 metres above the sea (*Biolley*, 1896).

S.W. Costa Rica: Golfo Dulce (*Pittier*, 1896); Turubares, 500 metres above the sea, on the Pacific slope (*Biolley*).

Beyond the spiral plate, the whole columellar margin is transversely rounded towards the interior, like a cornet or paper-bag, for which I use the term "convolutus." The parietal plate is very low, and only to be seen by looking into the aperture from above (fig. 20 *a*).

22. **Leptinaria emmelinæ.** (Tab. XVIII. fig. 21.)

Leptinaria emmelinæ, Tristr. P. Z. S. 1861, p. 231 [1]; Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 625 [2].

Tornatellina emmelinæ, Pfr. Monogr. Helic. Vivent. vi. p. 262 [3].

Hab. N. Guatemala: Coban (*Salvin* [1–3]).

The specimens which Mr. Salvin has sent me under this name are much smaller than the measurements given by Canon Tristram, and want the parietal tooth or plate mentioned by him; they are, probably, young individuals, and the typical one seems to have been lost. That which agrees best with the description is only 5 millim. long (instead of 15), its diameter 3 (instead of 5), the aperture 2 long and $1\frac{1}{2}$ in diameter; whorls barely 5 (instead of 7–8). The shell is distinctly perforate (this not being the case in *L. elisæ*), a character not mentioned by Canon Tristram; the columellar margin is much more feeble, and the spiral winding fold is separated by a light depression from the proper columellar margin. Although I am not quite sure that these specimens belong to the same species, I give, nevertheless, a figure of one of them.

TORNATELLINA.

Tornatellina, Beck, Index Moll. p. 80 (1837).

Shell oval or oblong, solid, with yellowish-coloured glossy periostracum; suture ordinarily linear, not deep; aperture oval or oblong, with a very thick, white, distinctly twisted, strongly notched columellar margin, and in most species also with a strong compressed plate on the upper wall of the aperture, entering far within.

This genus possesses most of the characters of *Leptinaria*, but differs from it in the solid, coloured shell. It is almost confined to the islands of the Pacific, from the Carolines to Juan Fernandez, only one species, the following, being said to belong to Central America.

1. Tornatellina cumingiana.

Tornatellina cumingiana, Pfr. P. Z. S. 1849, p. 134[1]; in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, *Pupa,* p. 148, t. 18. figg. 6, 7[2]; Monogr. Helic. Vivent. iii. p. 525[3]; v. Mart. in Albers's Die Helic. ed. 2, p. 260[4].

Ovate-oblong, with feeble vertical striæ.
Long. 8 millim., diam. $3\frac{2}{3}$; apert. long. $3\frac{2}{3}$, lat. $1\frac{2}{3}$.

Hab. S.W. Nicaragua: Realejo (Real Llejos) (*Cuming* [1–4]).

So far as I know, this species has not been again found by any later traveller, and the indication of locality rests on Cuming's authority alone.

MELANIELLA.

Melaniella, Pfeiffer, Monogr. Helic. Vivent. iv. p. 465 (1859); v. Mart. in Albers's Die Helic. ed. 2, p. 267.

Turrite, imperforate, vertically ribbed and (mostly) spirally striated, rather solid, dark-coloured, not shining, of about 8–9 whorls; aperture oval, expanded and produced beneath, as in the genus *Melania*, with simple columellar margin and simple thin outer margin.

Characteristic of the West-Indian Islands.

1. Melaniella fimbriata.

Bulimus fimbriatus, Forbes, P. Z. S. 1850, p. 36, t. 9. fig. 7[1]; Pfr. Monogr. Helic. Vivent. iii. p. 394[2].

Whorls convex, 7–8, columellar margin arcuated. Reddish-brown. 9 millim. long, 2 in diameter; aperture 2 long, 1 broad.

Hab. Panama (*Kellett & Wood* [1 2]).

This species also seems not to have been found again by later collectors.

CÆCILIANELLA.

Cæcilianella (Férussac), Bourguignat, Aménités Malac. i. p. 213 (1856); Fischer & Crosse, Miss. Scient. Mex., Mollusca, i. p. 584.

Shell small, oblong or subturrite, smooth, shining, white; aperture oblong, columellar margin notched beneath.

Animal subterranean, whitish, without eyes. For its anatomy, see P. Fischer and Crosse.

1. Cæcilianella veracruzensis.

Achatina iota (C. B. Adams), Strebel, Beitr. Mex. Land- und Süssw.-Conch. ii. p. 53, t. 13. fig. 50[1].
Cæcilianella veracruzensis, Crosse & Fisch. Journ. de Conch. xxv. p. 273 (1877)[2]; Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 591, t. 26. figg. 4, 4 *a*, *b*[3]; Strebel, loc. cit. v. p. 96[4].

Long. 2 millim., diam. $\frac{1}{2}$; apert. long. $\frac{3}{4}$, lat. $\frac{1}{3}$. Whorls 5. Shell, when viewed under the microscope, with very fine undulated spiral lines.

Hab. E. Mexico: Vera Cruz, in the alluvial deposits of the Rio Antigua (*Strebel* [1–4]).

Fam. PUPIDÆ.

Jaw feeble, striate or nearly smooth. Teeth of the radula subquadrate; no spiniform marginals. Shell oblong, with rather numerous, gradually increasing whorls; aperture often toothed.

PUPA.

Pupa, Draparnaud, Hist. Nat. Moll. Terr. et Fluv. Fr. pp. 24, 29 (1805); Pfeiffer, Monogr. Helic. Vivent. i. p. xxii (1848); v. Martens, in Albers's Die Helic. ed. 2, p. 286.

First whorls more rapidly increasing in size than the following whorls, forming a small cone on the upper part of the shell, the last three or four whorls scarcely increasing in width; aperture vertical, semioval or rounded, generally with thickened, toothed margins, the inner (columellar) margin nearly as long as the outer. Shell mostly small or very small in size. Lower feelers short, in the subgenus *Vertigo* absent.

Distribution universal, but the majority of the known species inhabiting Europe or North America.

Subgen. PUPILLA, Leach.

Pupilla, Leach, Syn. Moll. Brit. p. 91 (1852).

Shell barrel-shaped, very obtuse above, brown; teeth of the aperture few in number. Chiefly inhabiting Europe and North America.

1. Pupa leucodon.

Pupa leucodon, Morelet, Test. Noviss. ii. p. 13 (1851) [1]; Pfr. Monogr. Helic. Vivent. iii. p. 537 [2]; Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 311, t. 14. figg. 2, 2 *a*, *b* [3].

Hab. CENTRAL GUATEMALA: Salama, Baja Vera Paz (*Morelet* [1–3]).

2. Pupa ærstedi.

Pupa (*Pupilla*) *ærstedii*, Mörch, Malak. Blätt. vi. p. 111 (1859) [1].

Hab. NICARAGUA (*A. S. Ærsted* [1]).

Subgen. VERTIGO, Müll.

Vertigo, O. Müller, Verm. Terr. et Fluv. ii. p. 124 (1774).

Shell ovate, conical above, brownish; teeth of the aperture numerous. No lower feelers.

Almost universal, but most numerous in species in Europe and North America.

Comparative Table of the Species of *Pupa* and *Pupoides*.

Nomen.	Forma.	Sculptura.	Coloratio.	Dentes aperturæ.					Long.	Diam.	Apert.	Patria.
				Omnino.	Parietales.	Columell.	Extern.	Basales.				
				Pupa.								
leucodon, *Morel.*	abbreviato-cylindrica, apice obtusa.	vix striatula.	cornea, pellucida.	1	1	0	0	0	mm. 2	mm. 1	mm. $\frac{4}{5}$	Centr. Guatemala.
ærstedi, *Mörch*	cylindrica.	oblique striatula.	fusca, polita.	2	1	1	0	0	$3\frac{1}{2}$	2	?	Nicaragua.
ovata, *Say*	obese ovata.	glabriuscula.	fusco-cornea.	5–7	1–3	2	2	0	3	$1\frac{1}{2}$	1	N. America, E. Mexico.
contracta, *Say*	conico-ovata.	subtilissime striata.	hyalino-albida.	3–4	1 max.	1	1–2	0	3	$\frac{1}{3}$	1	N. America, E. & S.W. Mexico.
pellucida, *Pfr.*	subcylindrice oblonga.	„	pallide flavida, pellucida.	5	1	1	2	1	$2\frac{1}{3}$	1	$\frac{2}{3}$	Texas, Florida, Mexico, Guatemala, Panama, &c.
				Pupoides.								
marginatus, *Say*	conico-turrita.	lævis.	castaneo-fusca.	0	...	...	...	...	$4\frac{1}{2}$	2	$1\frac{1}{2}$	N. America, (Centr. ?) Mexico, &c.
chordatus, *Pfr.*	cylindrice elongata.	oblique costulata.	cornea.	0	...	...	...	...	$3\frac{1}{2}$–4	1	1	N.W. Mexico.

3. Pupa ovata.

Pupa (*Vertigo*) *ovata*, Say, Journ. Acad. Phil. ii. p. 375 (1822) [1]; Binney, Complete Writings of Say, p. 26 [2].

Vertigo ovata, Binney, Terr. air-breath. Moll. N. Am. ii. p. 334, t. 71. fig. 4 [3]; Land and Freshw. Shells N. Am. i. p. 252, figg. 442, 443 [4]; Man. Am. Land-Shells, p. 334, figg. 362, 363 [5]; Morse, Amer. Nat. i. p. 668, figg. 57, 58 [6]; Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 316 [7].

Pupa ovata, A. Gould, Bost. Journ. Nat. Hist. iv. p. 351, t. 16. figg. 7, 8 (1844) [8]; Küster, in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, *Pupa*, p. 119, t. 15. figg. 35–38 [9]; Pfr. Monogr. Helic. Vivent. ii. p. 360 [10]; v. Mart. Malak. Blätt. xii. p. 50 (1865) [11]; Binney, Man. Am. Land-Shells, p. 334, figg. 362, 363 [12].

Isthmia ovata, Morse, Journ. Portland Soc. i. p. 38, t. 10. fig. 94 (1864) [13].

Pupa modesta, Say, Long's Second Exped. to St. Peters River &c., App. p. 24, t. 15. fig. 5 (1824) [14]; Binney, Complete Writings of Say, p. 32 [15]; A. Gould, Report on Invertebr. Mass. p. 188, fig. 119 [16].

Hab. North America: New England [16] and the North-west Territory [14] to Arizona and Texas [12].

E. Mexico: Vera Cruz (*Hegewisch* [9 10], *Uhde* [11]).

This species is the North-American representative of the European *Pupa* (*Vertigo*) *antivertigo*, Drap. It is stated [4 5] to have two feelers only. The form of the jaw and radula has been described by Binney. Strebel did not meet with it in Mexico.

Subgen. Leucochilus, Böttg.

Pupa, subgen. *Leucochila*, part 2, v. Martens, in Albers's Die Helic. ed. 2, p. 296.
Leucochilus, Böttger, in v. Martens's Conch. Mittheil. i. p. 64 (1880).

Shell ovate or subcylindrical, pale-coloured; aperture with several teeth, that on the upper wall of the aperture (parietal tooth) very large.

Widely distributed, especially in North America, the Antilles, Abyssinia, and Oceania; in Europe only Miocene.

4. Pupa contracta.

Pupa contracta, Say, Journ. Acad. Phil. ii. p. 374 (1822) [1]; Binney, Complete Writings of Say, p. 25 [2]; A. Gould, Report on Invertebr. Mass. p. 186, fig. 117 [3]; Bost. Journ. Nat. Hist. iii. p. 399, t. 3. fig. 22 (1841) [4]; Pfr. Monogr. Helic. Vivent. ii. p. 356 [5]; Küster, in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, *Pupa*, p. 96, t. 13. figg. 16–18 [6]; Binney, Terr. air-breath. Moll. N. Am. ii. p. 324, t. 70. fig. 2 [7]; Land and Freshw. Shells N. Am. i. p. 242, figg. 420, 421 [8]; Man. Am. Land-Shells, p. 327, fig. 353½ [9]; Pilsbry, Proc. Acad. Phil. 1891, p. 315 [10].

Leucochila contracta, Morse, Am. Nat. i. p. 666, fig. 54 [11]; Tryon, Am. Journ. Conch. iii. p. 307, t. 21 (15). fig. 16 [12].

Pupa deltostoma (Charp.), Küster, in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, *Pupa*, p. 181, t. 21. figg. 17, 19 (1852) [13].

Hab. North America: Maine [12] and Massachusetts [3] to Iowa [12], Florida [12], and Texas [12].

E. Mexico: Orizaba (*Heilprin* [10]).

S.W. Mexico: Yautepec (*Heilprin* [10]).

"When fresh, it seems to be invested with a glutinous pubescence, by which particles of earth become entangled and partially conceal it" (*A. Gould* [4]).

5. Pupa pellucida.

Pupa pellucida, Pfr. Symb. Hist. Helic. i. p. 46 (1841) [1]; Monogr. Helic. Vivent. ii. p. 360 [2]; Küster, in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, *Pupa*, p. 89, t. 12. figg. 24, 25 [3]; Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 311 [4]; Strebel, Beitr. Mex. Land- und Süssw.-Conch. iv. p. 91, t. 4. fig. 19, t. 15. fig. 10 [5].

Vertigo (*Alæa*) *pellucida* (Pfr.), H. & A. Adams, Gen. Moll. ii. p. 172 [6].

Pupa (*Leucochila*) *pellucida* (Pfr.), v. Mart. in Albers's Die Helic. ed. 2, p. 296 [7]; Binney, Terr. air-breath. Moll. N. Am. iv. p. 147 [8], and v. p. 211, fig. 215 [9]; Land and Freshw. Shells N. Am. i. p. 246, fig. 249 (both figures copied from A. Gould) [10].

Leucochila pellucida (Pfr.), Tryon, Am. Journ. Conch. iii. p. 308, t. 15. fig. 24 (upper fig.) [11].

Pupa servilis, A. Gould, Bost. Journ. Nat. Hist. iv. p. 356, t. 16. fig. 14 (1843) [12]; Pfr. Monogr. Helic. Vivent. ii. p. 360 [13]; Shuttleworth, Mittheil. nat. Ges. Bern, 1853, Diagn. neuer Moll. no. 5, p. 144 [14]; Pilsbry, Proc. Acad. Phil. 1891, p. 315 [15].

Pupa rüsei, Pfr. Zeitschr. für Malak. 1852, p. 151 [16]; Monogr. Helic. Vivent. iii. p. 532 [17]; Küster, in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, *Pupa*, p. 176, t. 21. figg. 13, 14 [18].

Pupa pazi, Hidalgo, Journ. de Conch. xvii. p. 412 (1869) [19]; xxiii. p. 129, t. 7. fig. 7 (1875) [20]; Pfr. Monogr. Helic. Vivent. viii. p. 403 [21].

Pupa (*Leucochila*) *wolfii*, Miller, Malak. Blätt. (2) i. p. 127, t. 14. fig. 3 (1879) [22].

Hab. North America: Texas, in alluvial deposits (*Ferd. Römer*, 1847); Florida.

E. Mexico: Vera Cruz, on the beach (*Strebel*, 1860–61 [5]).

S.W. Mexico: Yautepec in Morelos (*Heilprin*, 1890 [15]).

S.E. Mexico: San Juan Bautista in Tabasco (*Höge*).

Yucatan: Sisal (*Morelet*, 1846–48 [4]); Merida (*Morelet* [4], 1846–48; *Heilprin*, 1890 [15]).

Central Guatemala: Salama (*Morelet*, 1846–48 [4]); Barranca de Villalobos, near the city of Guatemala, in grass (*Stoll*, 1878–83).

W. Guatemala: Antigua, under lichens on tree-trunks (*Ficus* sp.), at an elevation of 4500 feet (*Stoll*, 1878–83).

Panama (*Paz* [19 21]).

Ecuador: Guayaquil (*Theod. Wolf*, 1878 [22]).

Antilles: Cuba, Jamaica, Haiti, Puerto Rico, Vieque, St. Thomas, &c. (*Pfeiffer*, 1841 [1]; *Blauner*, 1854 [14]).

Probably introduced in some places by commerce: I have therefore noted the years in which it was observed in the Central American and other localities.

PUPOIDES.

Pupoides, Pfeiffer, Malak. Blätt. i. p. 192 (1854); Arango & Molina, Contrib. a la Fauna Malac. Cubana, p. 87 (1878); Clessin, Nomencl. Helic. Vivent. p. 256.

Pupa, subgen. *Leucochila*, part 1, v. Martens, in Albers's Die Helic. ed. 2, p. 296 (1860); Binney, Land and Freshw. Shells N. Am. i. p. 239; Terr. air-breath. Moll. N. Am. v. p. 203; Man. Am. Land-Shells, p. 324.

Shell oblong, with $5\frac{1}{2}$–7 convex whorls, rather conical above, of minute size; aperture semioval, with thick expanded margins, without teeth or plaits.

For radula and jaw see Binney [Terr. air-breath. Moll. N. Am. v. t. 4. fig. T; Jickeli, Land- und Süssw.-Moll. Nordost-Afr. (Nov. Act. Leopold. Acad. xxxvii.) 1874, p. 101, t. 2. fig. 1].

Intermediate between *Buliminus* and *Pupa*, resembling the former in the general shape and the want of apertural teeth, but agreeing with the latter in size and in the thick almost continuous peristome.

Widely distributed in North America, the Antilles, Western Africa, Abyssinia, South Arabia, Mesopotamia, British India, Australia, and Polynesia.

1. **Pupoides marginatus.** (Tab. XIX. fig. 1.)

Cyclostoma marginatum, Say, Journ. Acad. Phil. ii. p. 172 (1821) [1]; Binney, Complete Writings of Say, p. 22 [2].

Bulimus marginatus, Binney, Terr. air-breath. Moll. N. Am. iv. p. 136 [3]; Pfr. Monogr. Helic. Vivent. iv. p. 414 (part.) [4]; vi. p. 76 [5]; Tryon, Am. Journ. Conch. i. p. 285 [6].

Leucochila marginata, Tryon, Am. Journ. Conch. iii. p. 305, t. 15. fig. 11 (1867) [7].

? *Pupa fallax*, Say, Journ. Acad. Phil. v. p. 121 (1825) [8]; Binney, Complete Writings of Say, p. 28 [9]; A. Gould, Report on Invertebr. Mass. p. 192, fig. 123 [10]; ed. 2, p. 436, fig. 693 [11]; Pfr. Monogr. Helic. Vivent. ii. p. 309 [12]; iii. p. 533 [13] (not *P. fallax*, A. Gould, Bost. Journ. Nat. Hist. iv. p. 357, t. 16. fig. 15).

? *Pupa* (*Leucochila*) *fallax* (Say), v. Mart. in Albers's Die Helic. ed. 2, p. 296 [14]; Binney, Land and Freshw. Moll. N. Am. i. p. 239 (? fig. 414) [15]; Terr. air-breath. Moll. N. Am. v. p. 203 (part.) (not iii. and v. t. 52. fig. 1) [16]; Man. Am. Land-Shells, p. 324 (? fig. 351) [17].

Pupa albilabris, C. B. Adams, Vermont Moll. p. 158 (1842) [18]; Silliman's Am. Journ. Sci. (1) xl. p. 271 [19].

Shell conically turrite, rather widely perforate, feebly striate, somewhat glossy, dark yellowish-brown, the first two whorls pale yellow; whorls 6, regularly increasing in size, rather strongly convex, the first whorl much swollen, globiform. Aperture nearly vertical, oval; peristome very thick, distinctly expanded and reflexed, glossy white; outer margin strongly arcuated near its upper end; basal margin broadly rounded; columellar margin slightly arcuated; upper wall of the aperture smooth, brown, without any calcareous deposit.

Length $4\frac{1}{2}$, diameter scarcely 2 millim.; aperture with the peristome $1\frac{1}{2}$ millim. long and broad; last whorl, seen from the dorsal side, to the whole length as 1 : 3.

Hab. North America: New England [11 18 19] to S. Carolina and Nebraska to Texas [15 17].

Mexico: probably near the city (*Höge*).

Antilles: Cuba, Puerto Rico, St. Croix.

Probably also in the Bahamas and Bermudas. Very closely allied forms occur in the Old World, in Abyssinia, Southern Arabia, Mesopotamia, British India, Australia, and W. Africa [see Jickeli, Land- und Süssw.-Moll. Nordost-Afrikas, p. 99 (1874)]. The above description and figure are taken from Mexican specimens collected by Höge.

2. **Pupoides chordatus.**

Bulimus chordatus, Pfr. Malak. Blätt. 1856, p. 46 [1]; Monogr. Helic. Vivent. iv. p. 420 [2]; Novitat. Conch. iii. p. 410, t. 94. figg. 3–6 [3].

Pupa (*Leucochila*) *chordata*, v. Mart. in Albers's Die Helic. ed. 2, p. 296 [4]; Binney, Land and Freshw. Shells N. Am. i. p. 241, fig. 418 [5].

Pupa chordata, Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 313 [6].

Hab. N.W. Mexico: Mazatlan (*E. Klocke* [2–6]).

Fam. ELASMOGNATHA.

Jaw arcuated, ribbed, produced backwards into a quadrangular plate. Teeth of the radula as in the genus *Helix*.

SUCCINEA.

Succinea, Draparnaud, Hist. Nat. Moll. Terr. et Fluv. Fr. pp. 24, 58 (1805).

Shell ovate or oblong, with few whorls and a very large aperture, the margins of the latter straight and thin; the whole shell generally unicolorous, yellowish.

This genus is cosmopolitan, and most of its species are very much alike. The chief specific characters are to be found in the general shape, the greater or less convexity of the whorls, and the proportion of the aperture to the whole length of the shell. It must be noted, however, that the aperture is placed somewhat obliquely to the axis of the shell, and that the length, measured in its own plane, is little more than a fractional part of the whole length occupied by it; therefore, in the comparative table both measurements are given—the fractional part of the whole length in the column "Apertura," and the real length measured in the oblique direction in the last column but two.

The sculpture affords few points of distinction, consisting chiefly of the finer or coarser striæ.

Geographical distribution, universal, but more common in temperate than in tropical zones. Some species common to the Southern States of North America and to Mexico, but none of those of the West-Indian Islands appear to be identical with those of the mainland of Central America: *S. gundlachi*, Pfr., from Cuba, however, approaches the Mexican *S. luteola*, A. Gould; *S. approximans*, Gundl., from Cuba, and *S. dominicensis*, Pfr., from Haiti, resemble *S. guatemalensis*; and *S. sagra*, d'Orb., approaches *S. pueblensis*.

1. Succinea luteola.

Succinea luteola, A. Gould, Proc. Bost. Soc. Nat. Hist. iii. p. 37 (June 1848)[1]; Binney, Terr. air-breath. Moll. N. Am. ii. p. 75, t. 67 *c*. fig. 1[2]; iv. p. 41[3]; v. (Bull. Mus. Comp. Zool. Harv. Coll. iv.) p. 419, t. 67 *c*. fig. 1[4]; Land and Freshw. Shells N. Am. i. p. 261, fig. 466[5]; Man. Am. Land-Shells, p. 442, fig. 486[6]; Pfr. Monogr. Helic. Vivent. iii. p. 16[7]; Tryon, Am. Journ. Conch. ii. p. 239, t. 17. fig. 30[8]; Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 658, t. 27. figg. 2, 2 *a*, *b*[9]; Pilsbry, Proc. Acad. Phil. 1891, p. 318[10].

Succinea texasiana, Pfr. Monogr. Helic. Vivent. ii. p. 526 (Aug. 1848)[11]; in Ferd. Römer's Texas, p. 456 (1849)[12]; in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, *Daudebardia*, *Simpulopsis*, *Vitrina*, and *Succinea*, p. 42, t. 4. figg. 21, 22[13].

General form more oblong, with comparatively long spire (aperture occupying only $\frac{4}{7}$–$\frac{3}{5}$ of the whole length) and rather narrow aperture, scarcely enlarged towards the base; shell rather thick. Outside whitish or very pale yellow, often with greyish rays, especially in the upper whorls; inside often distinctly yellow, in dead shells white.

Long. 13, diam. $7\frac{1}{2}$; apert. long. 9, lat. $5\frac{1}{2}$ millim. (specimen from Venta de Zopilote).

Hab. North America: Galveston, Texas [11–13]; Florida [1–8].

N.E. Mexico: State of Tamaulipas (*Lieut. Couch*[9]).

S.W. Mexico: Venta de Zopilote in Guerrero (*H. H. Smith*).

Yucatan: Progreso (*Heilprin*[10]).

The specimen from Venta de Zopilote, from which the above description and measurements are taken, agrees in all essential points with examples from Texas and Florida.

Obs.—P. Strobel, Materiali per una Malacostatica dell' Argentinia meridionale [Biblioteca Malacologica, iv. p. 30 (1874)], has recorded *S. luteola*, A. Gould, from Bahia Blanca, in South America, about 38° S. lat.; but as he had only one bleached specimen from thence, and mentions some differences between it and Pfeiffer's figure, the identification appears to be very uncertain.

Var. *subtilis*, n. (Tab. XIX. fig. 2.)

Of smaller size, with very slender spire and deep sutures; outside glossy white, with conspicuous grey rays; inside white. Aperture occupying $\frac{5}{9}$ of the whole length.

Long. $10\frac{1}{2}$, diam. $5\frac{1}{2}$; apert. long. 6, lat. $3\frac{1}{2}$ millim.

Hab. E. Mexico: Vera Cruz (*Höge*).

Var. *rudiuscula* *, n. (Tab. XIX. fig. 3.)

Of somewhat larger size, and more or less distinctly wrinkled on the last whorl; outside very pale yellowish-white; inside white. General form somewhat variable, in some specimens as oblong as in typical *S. luteola*, in others with the last whorl more enlarged towards the base; aperture occupying $\frac{3}{7}$–$\frac{3}{5}$ of the whole length.

Long. 15, diam. 9; apert. long. $9\frac{1}{2}$, lat. $5\frac{1}{2}$ millim.
„ 14, „ 8; „ 9, „ 5 „
„ $12\frac{1}{2}$, „ 8; „ 9, „ $5\frac{1}{2}$ „

Hab. Central Mexico: Tehuacan (*Höge*).

Specimens with comparatively short spire and broad terminal whorl, of the dimensions

* Incorrectly written *radiuscula* on the Plate.

Comparative Table of the Species of *Succinea*.

Nomen.	Forma.	Sculptura.	Coloratio.	Apertura.	Anfractus.	Long.	Diam.	Aperturæ.		Patria.
								Long.	Lat.	
luteola, *A. Gould*	subcylindrico-ovata.	inæqualiter striatula.	alba, opaca, substrigosa, intus flavescens.	anguste ovata, basi vix dilatata, $\frac{4}{7}$–$\frac{3}{5}$ long.	4, rotundati.	mm. 10–13	mm. 5½–7½	mm. 6–9	mm. 4–5½	Florida, Texas, N.E. & S.W. Mexico, Yucatan.
——, var. subtilis, *v. Mart.*	acuminato-ovata.	,,	nitidula, griseo-strigosa.	anguste ovata, basi vix dilatata, $\frac{5}{9}$ long.	,,	10½	5½	6	3½	E. Mexico.
——, var. rudiuscula, *v. Mart.*	ovato-oblonga.	rugulosa.	flavescenti-albida, intus alba.	anguste ovata, basi vix dilatata, $\frac{3}{7}$–$\frac{3}{5}$ long.	,,	12½-15	8–9	9–9½	5-5½	Centr. Mexico.
virgata, *v. Mart.*	ovata.	striatula.	succinea, albido-strigosa.	ovata, $\frac{2}{3}$ long.	3½, rotundati.	8–10½	5–6½	6½–7	3½–4½	E., Centr., & S. Centr. Mexico.
——, var. högeana, *v. Mart.*	,,	,,	strigis antrorsum evanescentibus.	ovata, $\frac{3}{5}$ long.	,,	12½	8	8½	5	S. Centr. Mexico.
——, var. microspira, *Fisch. & Cr.*	,,	,,	substrigosa.	ovata, $\frac{4}{7}$ long.	,,	15	9	11	7	Centr. Mexico.
hortulana, *Morel.*	ovato-oblonga.	subruguloso-striata.	flavido-lutescens.	ovata, obliqua, $\frac{3}{5}$ long.	3½–4, perconvexi.	8–11	4–5	5–6	4	Centr. & W. Guatemala.
undulata, *Say*	ovata.	inæqualiter striata.	succinea.	ovata, $\frac{2}{3}$–$\frac{5}{7}$ long.	3½–4, sat convexi.	15–18	10–12	12–14	7-8	Centr. & S.E. Mexico.
——, var. moerchi, *Dkr.*	,,	rugosa, solida.	albida, prope aperturam flavescens.	ovata, marg. col. crassiusculo, $\frac{3}{5}$ long.	3½, sat convexi.	14–15	8–9	9–10	6	Centr. Mexico.
colorata, *Fisch. & Cr.* ...	oblongo-ovata.	leviter ruguloso-striata.	griseo-flava.	acute ovata, marg. col. vix arcuato.	3, convexi.	7–12	5–7	5–10	4–6	S.E. Mexico.

guatemalensis, *Morel.* ...	ovata.	inæqualiter pliculoso-striata.	isabellina, subopaca.	ovata, $\frac{5}{7}$ long.	3, convexiusculi, ult. supra planatus.	9–15	5–9½	6½–9	3–6	N., Centr., & W. Guatemala, E. & S.W. Costa Rica.
campestris, *Say*	breviter ovata.	inæqualiter striatula.	albida vel pallide flavescens, substrigosa.	ovata, $\frac{2}{3}$–$\frac{3}{4}$ long.	3, convexi.	10½–16	7–12	8–11	5–7	S. United States, Centr. Mexico.
pueblensis, *Fisch. & Cr.* .	ventricose ovata.	latiuscule ruguloso-striata.	olivaceo-flavescens, solidiuscula.	ovata, marg. col. subrecto, $\frac{6}{7}$ long.	3½, perconvexi.	15	9½	10	6	Centr. Mexico.
costaricana, *v. Mart.* ...	late et obtuse ovata.	ruguloso-striata.	fusco-succinea.	late ovata, $\frac{2}{3}$ long.	3, sat convexi.	8–11	6–8	5½–9	4–6	Centr. & S.W. Costa Rica.
brevis, *Dkr.*	subconico-ovata.	leviter striatula.	albida, solida.	ovata, $\frac{3}{5}$ long.	2½, perconvexi.	4½–6	3–4	3–4	2–3	Centr. Mexico.
salleana, *Pfr.*	complanata, anguste ovata.	striatula, subtil. spiratim striata.	pallide flavescens, pellucida.	acute ovata, $\frac{5}{7}$ long.	2½, rotundati.	14–19	7½–10	11–16	7–9	Louisiana, Centr. Mexico, N. Guatemala.
——, var. cordovana, *Fisch. & Cr.*	,,	,,	,,	,,	,,	8	5½	7	4	E. Mexico.
recisa, *Morel.*	obtuse ovata.	minutissime striata.	corneo-fulva.	ovata, marg. col. valde concavo, $\frac{7}{8}$ long.	3, rotundati.	9	6	7	4	E. & W. Guatemala, Centr. & S.W. Nicaragua, S. Panama.
ampullacea, *v. Mart.* ...	inflate ovata.	tenuiter striatula.	pallide succinea.	obtuse ovata, marg. col. concavo, $\frac{3}{4}$ long.	3, convexiusculi.	23	15	18	11	W. Mexico.
sonorensis, *Fisch. & Cr.* .	ovata.	subrugosa.	sordide albido-lutescens.	ovata, $\frac{2}{3}$ long.	3, rotundati.	11	6	7	4	N.W. Mexico.
concordialis, *Fisch. & Cr.*	oblongo-ovata.	tenuiter striata, subtil. spiratim striata.	pellucida, nitida.	ovata, marg. col. plicæformi, $\frac{7}{10}$ long.	3, ult. supra planatus.	10	6	8	4	E. Mexico.
carmenensis, *Fisch. & Cr.*	ovata.	striatula.	fulvido-cornea.	ovata, $\frac{2}{3}$ long.	3, rotundati.	8	5	5	3½	S.E. Mexico.

given in the third line, somewhat approach *S. virgata*; but differ from it in the wrinkled sculpture and dull coloration, without distinct rays on the last whorl.

One example approaches in its measurements and general form the var. *subtilis*, but differs from it in the wrinkled surface.

2. **Succinea virgata.** (Tab. XIX. fig. 4.)

Succinea virgata, v. Mart. Malak. Blätt. xii. p. 50, t. 1. figg. 6, 7 (1865)[1]; Pfr. Monogr. Helic. Vivent. v. p. 37[2]; Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 659[3].

Amber-coloured, with several whitish rays, rather solid, inside of the same colour as the outside; the proportions of the shell somewhat variable, the aperture occupying in the type $\frac{2}{3}$ of the whole length, but varying in different specimens to $\frac{11}{18}$ and $\frac{15}{23}$.

a. Long. 10·5, diam. $6\frac{1}{2}$; apert. long. 7, lat. $4\frac{1}{2}$ millim. (Vera Cruz, type).
b. „ 10, „ $6\frac{1}{2}$; „ 7, „ $4\frac{1}{2}$ „ (specimen from Oaxaca).
c. „ 9, „ $5\frac{2}{3}$; „ 6, „ 4 „ (another specimen from Oaxaca).
d. „ 8, „ 5; „ $5\frac{1}{2}$, „ $3\frac{1}{2}$ „ (specimen from Atoyac).
e. „ 8, „ $5\frac{1}{2}$; „ 6, „ $4\frac{1}{2}$ „ (specimen from Paso del Macho).

Hab. E. Mexico: Vera Cruz (*Fiedel*[1 3]; *Höge*); Sierra de Atoyac (*Höge*).
Central Mexico: Paso del Macho, in open country with low shrubby vegetation, and Tehuacan (*Höge*).
S. Central Mexico: Oaxaca (*Höge*).

Var. *högeana*, n. (Tab. XIX. fig. 5.)

Of larger size, rather thin, the whitish rays becoming evanescent towards the aperture; $\frac{3}{5}$ of the whole length occupied by the aperture.
Long. $12\frac{1}{2}$, diam. 8; apert. long. $8\frac{1}{2}$, lat. 5 millim.

Hab. S. Central Mexico: Oaxaca (*Höge*).

Var. *microspira*, n.

Succinea virgata, var. *β. microspira*, Fisch. & Crosse, loc. cit. p. 659, t. 27. figg. 3, 3 *a*, *b*[4].

Also of larger size, and with the whitish rays less conspicuous; but with shorter spire, the aperture occupying $\frac{4}{7}$ of the whole length.
Long. 15, diam. 9; apert. long. 11, lat. 7 millim.

Hab. Central Mexico: Puebla (*Boucard*[4]).

The specimen from Paso del Macho, quoted above, in its more ventricose form approaches this variety, but it is much smaller.

3. **Succinea hortulana.**

Succinea hortulana, Morelet, Test. Noviss. ii. p. 14 (1851)[1]; Pfr. Monogr. Helic. Vivent. iii. p. 18[2]; Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 668, t. 26. figg. 12, 12 *a*[3].

Hab. Central Guatemala: suburbs of the city of Guatemala, adhering to the walls of gardens (*Morelet*[1–3]).
W. Guatemala: Antigua, on moist spots on the aqueduct (*Stoll*).

In the comparatively long spire and the strong convexity of the penultimate whorl this species approaches the European *S. oblonga*, Drap.

One of the specimens from Antigua is of about the same size as Morelet's type; the two others are remarkably smaller, length 8 (instead of 11), diameter 4 (instead of 5), and the length of the aperture 5 (in Fischer and Crosse's figure [3] $6\frac{1}{2}$) millim. The aperture in all three is placed very obliquely, and in consequence occupies only about $\frac{3}{5}$ of the whole length of the shell, although the length of the aperture, measured in its plane, obliquely to the axis of the whorls, is to the whole length of the shell as 5 : 8 or $5\frac{1}{2} : 9\frac{1}{2}$. The tip in none of them is of darker colour than the rest of the shell.

4. **Succinea undulata.** (Tab. XIX. fig. 10.)

Succinea undulata, Say, New Harmony Disseminator of Useful Knowledge, ii. p. 230 (1829) [1]; Binney, Complete Writings of Say, p. 38 [2]; Pfr. Monogr. Helic. Vivent. ii. p. 526 [3]; in Martini & Chemnitz, Syst. Conch.-Cab., ed. 2, *Daudebardia, Simpulopsis, Vitrina,* and *Succinea,* p. 50, t. 5. figg. 12–14 (1854) [4]; Binney, Proc. Acad. Phil. 1860, p. 151 [5]; ? Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 656, t. 27. figg. 4, 4 *a*, *b* [6].

Succinea petiti, Beck, Ind. Moll. p. 98 (1837) (sine descr.) [7].

Succinea obliqua (Say), v. Mart. in Malak. Blätt. xii. p. 50 (1865) [8].

Hab. Central Mexico: Mexico, without nearer indication of locality, probably near the capital (*Say* [1–5]; *Beck* [7]; *Uhde* [8]; ? *Fischer & Crosse* [6]); Irapuato, in the State of Guanajuato, near the Rio Lerma, in the open country, and Sayula, State of Jalisco (*Höge*).

S.E. Mexico: Santecomapan, near Tuxtla, State of Vera Cruz (*Sallé* [6]).

This is the largest of the Mexican species of *Succinea*. A specimen collected by Uhde measures: long. 19, diam. 11; apert. long. $13\frac{1}{2}$, lat. 8 millim.; aperture occupying $\frac{13}{19}$ of the whole length. One obtained by Höge at Irapuato has a diameter of 11 millim.; aperture 14 long and 8 broad, but the apex is injured. It is allied to *S. obliqua*, Say, but distinguished from it by the more wrinkled surface, especially of the last whorl, and by the less convex upper whorls, with shallower sutures. *S. obliqua* does not extend, according to Binney, further southward than Georgia and Arkansas.

Say's type specimen of *S. undulata* is lost, and A. Gould has suggested that it may have belonged to *S. luteola*; but the words in Say's description "testa subovata, pallide flavescens, translucens, fragilis, obsolete rugosa," and chiefly "anfractus ultimus corrugatus," agree much better, I think, with the shell which Dr. Pfeiffer has figured as *S. undulata* than with *S. luteola*. Moreover, the peculiar coloration of *S. luteola* is not alluded to in Say's description, and its characteristic shape, with remarkably small aperture, does not suggest any affinity with *S. ovalis*, urged by Say himself. Concerning Fischer and Crosse's figure [6], I do not see in it the scattered stronger wrinkle-like striæ which are distinctly visible in Pfeiffer's figure [4]. As regards *S. petiti*, Beck, the late Dr. Mörch has informed me that the type specimen in the Copenhagen Museum is 15 millim. long, and not unlike a somewhat lengthened specimen of *Limnæa*

vulgaris, C. Pfr., which more nearly resembles *S. undulata* than any other Mexican form of this genus.

Var. *moerchi*. (Tab. XIX. fig. 8.)

Succinea moerchi, Dunker, in Paetel's Catalog d. Conchyl.-Samml. ii. p. 366 (1889) (sine descr.)[2].

Shell smaller, but remarkably thick, very distinctly wrinkled, whitish, with a yellow hue near the aperture; columellar margin thickened, enlarging upwards and passing over into a callous deposit on the upper wall of the aperture. About $\frac{3}{5}$ of the whole length occupied by the aperture.

Long. 14, diam. 9; apert. long. 9, lat. 6 millim.
„ 15, „ 8; „ 10, „ 6 „

Hab. CENTRAL MEXICO: Zimapan, State of Hidalgo (*David*, in the late Dunker's collection).

To judge from the thickness, the strong wrinkles, the dull coloration, and the smaller size of the shell, this form is probably found in dry unfavourable localities. One specimen appears to have been broken near the aperture, probably by falling from a shrub, and has been restored in an irregular manner; another has two strong thickenings somewhat before the aperture, showing that the growth has been interrupted twice for some time at these spots.

This variety resembles *S. luteola*, var. *rudiuscula*, but may be distinguished from it by the more inflated shell and the deeper, more oblique suture.

5. Succinea colorata.

Succinea undulata, var. *colorata*, Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 657, t. 27. figg. 5, 5 *a*, *b*[1].

Testa oblongo-ovata, solidula, leviter ruguloso-striata, nitidula, griseo-flava, apice intensius colorato (rubescente); anfr. 3, vix convexi, sutura non profunda; apertura $\frac{2}{3}$ totius longitudinis paulo superans, acute ovata, paulum obliqua, intus concolor, nitida, striata, margine columellari levissime arcuato.

Long. 12, diam. 7; apert. long. 10, lat. 6 millim.[1].
„ 11, „ 7; „ $8\frac{1}{2}$, „ 5 „
„ 10, „ 6; „ 8, „ 5 „
„ 7, „ 5; „ 5, „ 4 „ (young).

Hab. S.E. MEXICO: State of Tabasco (*Dr. Berendt*[1]); San Juan Bautista in Tabasco (*H. H. Smith*).

More resembling the European *S. pfeifferi* than *S. putris*; distinct from *S. undulata* in the much less convex whorls and weaker wrinkles. Fischer and Crosse describe the colour as reddish-rose in the two upper whorls, and pale fallow-yellow in the last whorl. The specimens from San Juan Bautista have no distinct red on the upper whorls, but only a little darker yellowish-brown hue; the measurements of the largest of them is given above in the second line, those of a younger one in the third line.

6. **Succinea guatemalensis.** (Tab. XIX. fig. 9.)

Succinea guatemalensis, Morelet, Test. Noviss. i. p. 16 (1849) [1]; Pfr. Monogr. Helic. Vivent. iii. p. 17 [2]; Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 667, t. 26. figg. 11, 11 *a* [3].

Succinea, sp., Biolley, Moluscos terr. y fluv. de Costa Rica, 1897, p. 15 (part.) [4].

The chief distinguishing features of this species seem to be the fine and somewhat unequal striæ, the pale isabelline colour, and the very faint lustre of the surface. The whorls are only a little convex, the upper part of the last one being rather flattened compared with the two upper whorls, which are distinctly convex: this is not expressed in Fischer and Crosse's figure. The reddish hue of the first whorl is seen in some of my specimens from Antigua, but is wanting in those collected by Dr. Stoll in the city of Guatemala, while it is mentioned by Morelet [1] for his examples from the same city. Whorls 3–3½. The specimens from Costa Rica want also the reddish colour on the first whorl; those from Turubares are unusually large, but thin and fragile.

Long. 15, diam. 8–9; apert. long. ?, lat. ? millim. (Morelet).
„ 13½, „ 9½; „ 9, „ 6 „ (Fischer & Crosse's figure).
„ 14, „ 8; „ 9, „ 6 „ (largest specimen from Antigua).
„ 11, „ 6; „ 8, „ 5 „ (Stoll's largest specimen from Guatemala city).
„ 9⅔, „ 6; „ 6½, „ 3⅔ „
„ 7½, „ 5; „ 5, „ 3½ „ (specimen from Panzos).
„ 14, „ 8½; „ 10, „ 5 „ (specimen from Turubares, Costa Rica).
„ 9, „ 5; „ 6½, „ 3 „ (specimen from Cascadas, Costa Rica).

Hab. N. Guatemala: Panzos (*Conradt*).

Central Guatemala: city of Guatemala, on the banks of small streams (*Morelet* [1–3]) and on moist walls (*Stoll*).

W. Guatemala: Antigua, on moist spots on the aqueduct (*Stoll*).

E. Costa Rica: Turrialba, 500 metres above the sea, on the Atlantic slope (*Pittier*, *Biolley* [4]).

S.W. Costa Rica: Turubares, 200 metres above the sea (*Biolley*); Rio de las Cascadas, at the foot of the great fall, in the valley of the Rio Diquis (*Pittier*, Febr. 1896).

7. **Succinea campestris.**

Succinea campestris, Say, Journ. Acad. Phil. i. p. 281 (1817) [1]; Binney, Complete Writings of Say, p. 12 [2]; Pfr. Symb. Hist. Helic. ii. p. 56 [3]; Monogr. Helic. Vivent. ii. p. 524 (excl. syn. Gould) [4]; Férussac, Hist. Nat. Moll. Terr. ii. t. 11. fig. 12 [5]; Binney, Terr. air-breath. Moll. N. Am. ii. p. 67, t. 67 *b*. fig. 1 [6]; Man. Am. Land-Shells, p. 443, fig. 480 [7]; Tryon, Am. Journ. Conch. ii. p. 231, t. 17. fig. 4 [8]; Pilsbry, Proc. Acad. Phil. 1891, p. 318 [9] (not *Succinea campestris*, Pfr. in Martini & Chemnitz, nor Dekay, Zool. New York).

Succinea inflata, Lea, in Proc. Am. Phil. Soc. ii. p. 31 (1841) [10]; Obs. Gen. *Unio*, iv. p. 5 [11]; Pfr. Monogr. Helic. Vivent. ii. p. 520 [12]; and in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, *Daudebardia*, *Simpulopsis*, *Vitrina*, and *Succinea*, p. 49, t. 5. figg. 9–11 [13]; Binney, Terr. air-breath. Moll. N. Am. iv. p. 34, t. 80. fig. 11 [14].

Hab. North America: South Carolina, Georgia, and Florida.

Central Mexico: Lake Texcoco, near the city of Mexico (*Heilprin* [9]).

I have not seen Heilprin's specimens; they may belong to *S. brevis*, Dkr. The type is from the Southern United States; a variety (*unicolor*, Tryon) occurs at New Orleans.

8. **Succinea pueblensis.**

Succinea aurea (Lea), v. Mart. in Malak. Blätt. xii. p. 50 (1865) [1].
Succinea pueblensis, Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 669, t. 26. figg. 15, 15 *a-c* [2].

A rounded, ventricose, rather solid species, with comparatively short and blunt spire, and somewhat broadly flattened unequal striæ.

Hab. CENTRAL MEXICO: neighbourhood of Puebla (*Boucard* [2]); Mexico, without nearer indication of locality, probably from near the capital (*Uhde* [1]).

Allied to *S. totteniana*, Lea, from New England and New York, in the general outlines, but with different sculpture.

9. **Succinea costaricana.** (Tab. XIX. fig. 6.)

Succinea, sp., Biolley, Moluscos terr. y fluv. de Costa Rica, p. 15 (part.) (1897) [1]. .

Testa late ovata, inequaliter ruguloso-striata, fusco-succinea, tenuis; spira tumida, obtusa; anfr. 3, sat convexi, sutura sat profunda, discreti, ultimus superne paulum complanatus; apertura late ovata, $\frac{2}{3}$ totius longitudinis occupans, superne leviter angulata, medio dilatata, infra late rotundata, margine columellari tenui, bene arcuato.

Long. 11, diam. 8; apert. long. 8½, lat. 6 millim. (Djiri Durunia).
„ 11½, „ 8; „ 9, „ 5½ „ (San José).
„ 10, „ 6; „ 7, „ 4 „ (La Palma).
„ 8, „ 6; „ 5½, „ 4 „ (collected by Rogers).

Hab. CENTRAL COSTA RICA: environs of San José and at La Palma, 1161 and 1600 metres above the sea (*Biolley*, 1891 and 1895); Costa Rica, without nearer indication of locality (*Rogers*).

S.W. COSTA RICA: Thermal springs of Djiri Durunia, valley of the Rio Diquis, 900 metres above the sea, and Savana de Guacimo, in the valley of the Rio Brus (*Pittier*, 1897).

Perhaps also at Coban, Guatemala, where Conradt collected a very similar shell, but all his specimens which I have seen are somewhat injured.

Near *S. pueblensis*, but thinner, with finer sculpture and more arcuated columellar margin.

G. F. Angas (P. Z. S. 1879, p. 484) mentions *S. undulata*, Say, as having been found by the late Dr. Gabb in the coast-region of (S.E.) Costa Rica to the lower hills; it is probable, however, that the specimens collected by Dr. Gabb belong to a different spec es, either to *S. guatemalensis* or *S. costaricana*. I have examined many specimens of this genus collected in Costa Rica by H. Pittier and P. Biolley (but none from the S.E. coast), and have never found *S. undulata* amongst them.

10. **Succinea brevis.** (Tab. XIX. fig. 7.)

Succinea brevis (Dunker), Pfr. in Malak. Blätt. vii. p. 84 (1850) [1]; Monogr. Helic. Vivent. iii. p. 17 [2]; and in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, *Daudebardia, Simpulopsis, Vitrina,* and *Succinea,* p. 51, t. 5. figg. 15–17 [3]; Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 655, t. 26. figg. 14, 14 *a, b* [4].

A small, subglobose, smooth shell, sufficiently described and figured in the above-quoted works. All the specimens which I have seen, even the typical one in Dunker's collection, now in the Berlin Museum, are of a dull white, probably bleached.

Hab. Central Mexico: Zimapan, State of Hidalgo (*David* [1–3]).

Some Cuban specimens, given, with the name *S. brevis*, Dunk., by Gundlach to the Berlin Museum, approach this species closely in form, but are considerably smaller and thinner. I am not quite satisfied concerning their identity as species.

11. **Succinea salleana.**

Succinea salleana, Pfr. P. Z. S. 1849, p. 133 [1]; Monogr. Helic. Vivent. iii. p. 16 [2]; Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, *Daudebardia, Simpulopsis, Vitrina,* and *Succinea,* p. 49, t. 5. figg. 7, 8 [3]; Tristram, P. Z. S. 1863, p. 411 [4]; v. Mart. Malak. Blätt. xii. p. 51 (1865) [5]; Tryon, Am. Journ. Conch. ii. p. 240, t. 17. fig. 32 (1866) [6]; Binney, Terr. air-breath. Moll. N. Am. iv. p. 42, t. 79. fig. 18 [7]; Land and Freshw. Shells N. Am. i. p. 270, fig. 486 [8]; Man. Am. Land-Shells, p. 443, fig. 488 [9]; Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 666 [10].

? *Succinea putris,* Tristram, P. Z. S. 1861, p. 230 [11].

Spire short, but more acute than in *S. recisa*; aperture very broad below; shell thin, pale-coloured.

Hab. North America; New Orleans [1–3 6–9].

Central Mexico: cold regions ("tierra fria") of the State of Vera Cruz (*Deppe & Schiede* [5]).

N. Guatemala: Coban (*Salvin* [4 11]).

Var. *cordovana.*

Succinea undulata, var. *cordovana,* Fisch. & Crosse, loc. cit. p. 658, t. 27. figg. 7, 7 *a* [12].

Smaller; whorls scarcely 3.
Long. 8, diam. $5\frac{1}{2}$; apert. long. 7, lat. 4 millim.

Hab. E. Mexico: Cordova (*Sallé* [12]).

12. **Succinea recisa.**

Succinea recisa, Morelet, Test. Noviss. ii. p. 14 (1851) [1]; Pfr. Monogr. Helic. Vivent. iii. p. 18 [2]; Tate, Am. Journ. Conch. v. p. 158 (1859) [3]; Tryon, Proc. Acad. Phil. 1863, p. 146 [4]; Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 654, t. 26. figg. 13, 13 *a* [5].

Distinct from the other Central-American species of the genus in the very short spire. The type described by Morelet [1 2 5] is of remarkably smaller size than a specimen found by Dr. Stoll at Antigua.

Long. 10, diam. 8; apert. long. ?, lat. ? millim. (Morelet [1]).
„ 10, „ 6; „ $7\frac{1}{2}$, „ 5 „ (figure given by Fischer & Crosse [5]).
„ 12, „ 8; „ 10, „ $6\frac{1}{2}$ „ (Stoll's specimen).

Hab. E. Guatemala: around the Lake of Yzabal (Golfo Dulce), under the bark of trees (*Morelet* [1 2 5]).

W. Guatemala, Antigua, on the aqueduct, in company with *S. guatemalensis* (Stoll).

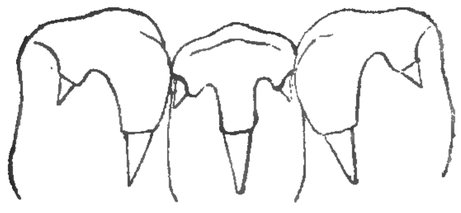
Central and S.W. Nicaragua: Matagalpa (*Rothschuh, in Mus. Berol.*); around the Lake of Nicaragua and near the Rio San Juan (*Tate* [3]).

S. Panama: Panama (*Tate* [3], *Capt. Field* [4]).

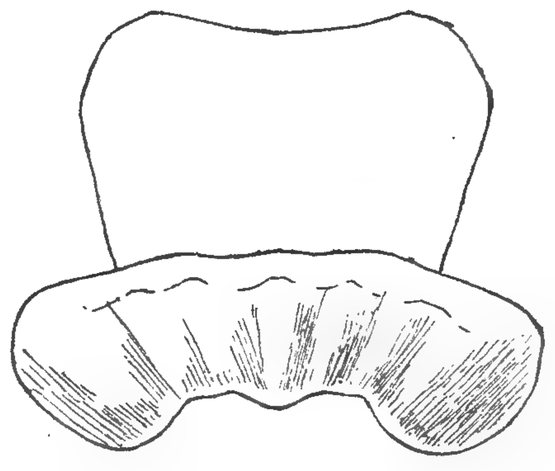
13. **Succinea ampullacea,** sp. n. (Tab. XIX. fig. 11.)

Testa inflate ovata, tenuis, leviter striatula, nitidula, pallide succinea; spira perbrevis, conica; anfr. 3, convexi, ultimus ventrosus; apertura $\frac{3}{4}$ longitudinis æquans, ovata, parum obliqua, superne paulum angustata, margine externo et basali arcuatis, columellari tenuissimo, sat concavo.

Long. 23, diam. 15; apert. long. 18, lat. 11 millim.



Median tooth and first laterals.



Jaw.

Hab. W. Mexico: Ameca, State of Jalisco (*Richardson*).

This shell is extremely like some of the forms of *Limnæa*, but the structure of the jaw and the radula shows that it really belongs to *Succinea*. The quadrate appendage to the jaw is well developed, and the teeth of the radula are formed as in *Succinea*, the median tooth being equal in size to the laterals, and all having comparatively large pointed cusps.

Of the following species or varieties, which for convenience are here placed at the end of the genus, I have had no opportunity of examining specimens. They must therefore remain as doubtful for the present.

Succinea concordialis (A. Gould), Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 670, t. 27. figg. 10, 10 *a*, *b*.—Mexico, Toxpam, State of Vera Cruz (*Sallé*).

The figure given by the authors (diameter of the shell one-half of its length, aperture occupying seven-tenths of the whole length) differs somewhat from that given by Binney (Terr. air-breath. Moll. N. Am. t. 77. fig. 2) (diam. four-sevenths, aperture two-thirds of the length). A. Gould's type was from Lake Concordia, Texas.

Succinea undulata, var. *carmenensis*, Fisch. & Crosse, loc. cit. pp. 657, 658, t. 27. figg. 6, 6 *a*.—Mexico, Carmen Island, on the frontier of Tabasco and Yucatan (*Morelet*).

This shell has a more lengthened spire than the other forms of *S. undulata* described by Fischer and Crosse, one of which is referred by me to *S. salleana*. It differs from *S. undulata* (Say), Pfeiffer, in the remarkably narrow form of the whole shell.

Succinea lineata, var. *sonorensis*, Fisch. & Crosse, loc. cit. p. 662, t. 27. figg. 8, 8 *a*, *b*.—Mexico, in the neighbourhood of the Yaqui River in Sonora (*Dr. E. Palmer*).

Also a rather narrow form; it wants the spiral (revolving) lines which are characteristic of *S. lineata*, Binney, from Nebraska, and from which that species has got its name. The outline of Fischer and Crosse's figure also differs considerably from that given by Binney (Terr. air-breath. Moll. N. Am. v. p. 420, fig. 208) and by Tryon (Am. Journ. Conch. ii. t. 17. fig. 16). Binney, however, mentions Sonora among the localities for *S. lineata*.

Succinea cingulata, Forbes, P. Z. S. 1850, p. 56, t. 9. fig. 8 (description copied by Pfr. Monog. Helic. Vivent. iii. p. 17, and Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 661).—Mexico, Mazatlan (*Capt. Kellett, on the Voyage of the 'Herald'*).

The original figure looks very unlike a species of this genus; and Fischer and Crosse have suggested that *S. cingulata* may be a young specimen of some *Bulimulus*. E. Smith, however, who has examined the type specimen in the British Museum, informs me that in his opinion it belongs to *Limnæa*.

For *Succinea obliqua* and *S. aurea*, mentioned by Fischer and Crosse (loc. cit.), see *S. undulata* and *S. pueblensis*.

Fam. ARIONIDÆ.

Shell reduced in size, not covering the whole animal, or internal, or wanting; mantle not covering the whole animal. Jaw and radula as in the family Aulacognatha, *anteà*, p. 126.

For the purpose of easier determination I shall treat together all the Stylommatophora without shell, or with the shell not covering the whole animal, arranging them in the natural families Arionidæ, Limacidæ, and Veronicellidæ, but giving a Comparative Table of the genera occurring in Mexico and Central America, based upon the degree of development of the shell and the extension of the mantle. The genus *Onchidium* is included for comparison in the Table, but it will be placed at the end of the volume, among the submarine mollusca, it being strictly confined to the sea-coast.

Comparative Table of the Genera of Asionidæ, Limacidæ, and Veronicellidæ.

Name.	General form.	Mantle.	Hinder end.	Shell.	Pulmonary orifice.	Jaw.	Teeth of the radula.
Xanthonyx, Cr. & Fisch. ...	Helicoid.	within the shell.	no caudal pore.	external, spiral.	right side.	ribbed.	subquadrate median 3-, laterals 2-cusped.
Velifera, Gabb	,,	reflexed over a part of the shell.	a caudal pore.	external part globose, of 3 whorls.	right side, within the aperture of the shell.	smooth, with median projection.	median and lateral teeth subquadrate, marginals aculeiform.
Cryptostracon, Binney ...	slug-like, swollen in the middle of the back (mantle).	covering only a small middle part of the body.	no pore.	inside the mantle, ear-shaped, asymmetrical.	right side, on the edge of the mantle.	ribbed.	quadrate.
Ariolimax, Mörch	,,	covering the anterior part of the body, granulated.	a distinct mucous pore.	internal, flat, not spiral.	right side, a little behind the middle of the mantle.	,,	subquadrate, median 1-, laterals 2-cusped, marginals aculeiform.
Limax, L., subgen. Hydrolimax, Malm.	,,	covering the anterior half of the body.	pointed; no pore.	,,	right side, in the hinder half of the mantle.	smooth, with median projection.	median 3-cusped, median and laterals subquadrate, marginals aculeiform.
Philomycus, Raf.	,,	covering the whole length of the body.	no caudal pore.	0	right side, in the foremost part of the mantle.	slightly striated, with median prominence.	narrowed-quadrangular, median 1-cusped, laterals and marginals with a second smaller cusp externally.
Veronicella, Blainv.	flat, broader than high, oblong.	covering the whole length and overlapping on the sides, coriaceous.	obtusely rounded.	0	at the hinder extremity of the body, nearly median.	ribbed.	subquadrate, 1-cusped.
Onchidium, Buchanan.....	ovate, convex above.	overlapping the foot on all sides, papillate or tuberculated.	,,	0	at the hinder extremity, in the median line.	0	peculiarly hook-shaped.

XANTHONYX.

Simpulopsis, Pfeiffer, Monogr. Helic. Vivent. iv. p. 799 (part.).
Xanthonyx, Crosse & Fischer, Journ. de Conch. xv. p. 223 (1867); Miss. Scient. Mex., Mollusca, i. p. 192.

Shell external, very thin, with few rapidly increasing whorls and short spire, imperforate; aperture wide, rounded, thin-edged. Jaw strongly ribbed; teeth of the radula subquadrate, median tooth tricuspid, laterals with two cusps. The shell may be distinguished from that of *Simpulopsis* (anteà, p. 252) by the depressed form, flat top, and very wide aperture.

Confined to Mexico, so far as at present known.

COMPARATIVE TABLE OF THE SPECIES OF *XANTHONYX*.

Nomen.	Forma.	Sculptura.	Coloratio.	Apertura.	Long.	Diam.	Apert. long.	Patria.
					mm.	mm.	mm.	
salleanus, *Pfr.*	subsemiovata, solidula.	striatula, nitida, lineis spir. impressis obsoletis, testa embr. læviuscula.	corneo-straminea.	"lunato-rotundata," intus margaritacea, marg. colum. tenui.	14 15	7 7½	11 ...	E. & S. Central Mexico.
cordovanus, *Pfr.* ...	subsemiglobosa, tenuis.	minute striatula, lineis spir. impressis, testa embr. costulata.	virenti-cornea.	marg. colum. latiusculo.	15	7	10	E. Mexico.
sumichrasti, *Brot* ...	oblongo - semiovata, tenuis.	leviter striatula, nitidissima.	fusculo-cornea.	,,	12	6½	8½	Mexico.
chiapensis, *Pfr.* ...	depresse globosa, tenuissima.	confertius striata, nitida.	cornea, pellucida.	lunato-circularis, marg. externo superne subrecedente.	8½	4⅓	...	S.E. Mexico.

1. Xanthonyx salleanus.

Simpulopsis salleana, Pfr. P. Z. S. 1856, p. 319, t. 25. figg. 15, 16[1]; Monogr. Helic. Vivent. iv. p. 801[2]; Binney, Proc. Acad. Phil. 1860, p. 151[3]; Reeve, Conch. Icon. xiii., *Simpulopsis*, t. 2. fig. 9[4].

Xanthonyx salleanus (Pfr.), Crosse & Fisch. Journ. de Conch. xv. p. 225 (1867)[5]; Miss. Scient. Mex., Mollusca, i. p. 199, t. 10. figg. 2, 2 *a*[6]; Strebel, Beitr. Mex. Land- und Süssw.-Conch. iv. p. 26, t. 2. figg. 1 *a–e*, t. 10. fig. 8 (embryonal whorl)[7].

Hab. E. MEXICO: wood of Pacho, near Jalapa (*Salas*[7]); Cordova (*Sallé*[1–6]).

S. CENTRAL MEXICO: Oaxaca (*Höge*).

2. Xanthonyx cordovanus.

Simpulopsis cordovana, Pfr. P. Z. S. 1856, p. 319[1]; Monogr. Helic. Vivent. iv. p. 801[2]; Binney, Proc. Acad. Phil. 1860, p. 151[3]; Reeve, Conch. Icon. xiii., *Simpulopsis*, t. 2. fig. 10[4].

Xanthonyx cordovanus, Crosse & Fisch. Journ. de Conch. xv. p. 226 (1867)[5]; Miss. Scient. Mex., Mollusca, i. p. 200, t. 10. figg. 3, 3 *a*[6]; Strebel, Beitr. Mex. Land- und Süssw.-Conch. iv.

p. 27, t. 2. figg. 1 *f*, *g*, t. 10. fig. 7 (embryonal whorl), A–G (anat.), t. 9. figg. 14 (radula and 21 (jaw) [7].

Hab. E. Mexico: San Antonio del Monte, between Jalapa and Misantla (*Strebel* [7]); Cordova (*Sallé* [1–6]).

3. **Xanthonyx sumichrasti.**

Vitrina sumichrasti, Brot, Journ. de Conch. xv. p. 70, t. 4. fig. 2 (1867) [1]; Monogr. Helic. Vivent. v. p. 20 [2].

Xanthonyx sumichrasti (Brot), Crosse & Fisch. Journ. de Conch. xv. p. 214, t. 10. figg. 1–4 (sub *Leptonyx*) (jaw, radula, anat.) [3]; Miss. Scient. Mex., Mollusca, i. p. 201, t. 9. figg. 14–17 (anat.) [4].

Hab. Mexico, without nearer indication of locality (*Sumichrast* [1–4]).

4. **Xanthonyx chiapensis.**

Simpulopsis chiapensis, Pfr. P. Z. S. 1856, p. 377 [1]; Malak. Blätt. iii. p. 230 (1856) [2]; Monogr. Helic. Vivent. iv. p. 802 [3]; Reeve, Conch. Icon. xiii., *Simpulopsis*, t. 1. fig. 1 [4].

Xanthonyx chiapensis (Pfr.), Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 203 [5].

Hab. S.E. Mexico: Chiapas (*Ghiesbreght* [1–5]).

It is probable that these four so-called species are not really distinct. The descriptions given by Pfeiffer appear to be sufficiently characteristic, but when the figures are consulted it is not easy to understand the differences. Fischer and Crosse state that spiral striæ are also visible in their specimen of *X. cordovanus*; Strebel introduces the distinct costulation of the first whorl as an important difference between *X. cordovanus* and *X. salleanus*, but as neither Pfeiffer nor Fischer and Crosse mention it, it remains doubtful whether their *X. cordovanus* is really the *X. cordovanus* of Strebel. I am inclined to agree with the French authors that the four forms may be due to age and individual development.

CRYPTOSTRACON.

Cryptostrakon, Binney, Ann. N. York Acad. Sci. i. p. 258 (1879).

Shell vitrinoid, depressed, ear-shaped, with very wide aperture, membranaceous, entirely concealed by the mantle. Jaw arched, with a few stout ribs. Radula with quadrate irregularly bicuspid marginal teeth.

Confined to Costa Rica.

1. **Cryptostracon gabbi.**

Cryptostrakon gabbi, Binney, Ann. N. York Acad. Sci. i. pp. 259, 260, t. 11. figg. H–K (living animal, shell, jaw, and radula) [1] (1879); iii. p. 104, t. 7. fig. K (radula), t. 16. fig. L (jaw) (1884) [2].

Shell flat, of about 2 whorls, very membranous, about 14 millim. in greatest diameter. Animal varying from black to shades of brown and variously mottled with black or dark brown, about 70 millim. long.

Hab. Central Costa Rica: flanks of the Pico Blanco, 5000 to 7000 feet (*Gabb* [1 2]).

ARIOLIMAX.

Ariolimax, Mörch, Malak. Blätt. vi. p. 110 (1860); Binney, Land and Freshw. Shells N. Am. i. p. 278; Man. Am. Land-Shells, p. 92.

Slug-like, with a mucous pore at the extremity of the body, and a flat, calcareous, oblong (not spiral), somewhat asymmetrical shell within the mantle. Pulmonary orifice at the posterior third of the mantle, with a cleft on its right margin. Jaw slightly arcuated, with strong ribs. Teeth of the radula subquadrate; median large, with long median cusp; laterals with two cusps, the inner one longest; marginals aculeiform. [Binney, Ann. Lyc. N. York, x. p. 297, t. 13. fig. 1 (1873).]

Differs from the European *Arion* in the presence of an internal shell.

Confined to the west coast of North and Central America.

1. Ariolimax costaricensis.

Ariolimax californicus, subsp. *costaricensis*, Cockerell, Ann. & Mag. Nat. Hist. (6) vi. pp. 278, 279 (1890) [1].

Dark olivaceous, back well keeled behind. Length 68, breadth 17; mantle 27 millim.

Hab. Costa Rica (*Janson, in Mus. Brit.* [1]).

Very near *A. californicus*, Cooper.

PHILOMYCUS.

Philomycus, Rafinesque, Annals of Nature or Annual Synopsis, i. p. 14, ed. Binney & Tryon, p. 64 (Philadelphia, 1820); Férussac, Tab. Syst. Moll., Prodr. p. 14 (1821); Stoliczka, Journ. Asiat. Soc. xlii. 2, p. 29 (1872).

Tebennophorus, Binney, Bost. Journ. Nat. Hist. iv. p. 163 (1842); Land and Freshw. Shells N. Am. i. p. 295; Fischer & Crosse, Miss. Scient. Mex., Mollusca, i. p. 183.

Mantle extending over the whole length of the body, so that it is not distinct from the general dorsal surface, without keel. Pulmonary orifice on the right side, in the foremost part of the mantle. Jaw arched, slightly striated, with median prominence. Teeth of the radula subquadrate; median one-cusped, with a very small lateral cusp on each side in some species; laterals two-cusped, external cusp much shorter than the inner one.

Geographical distribution: North and Central America, Japan, China, India, Java.

I agree with the late Dr. Stoliczka that Rafinesque's description clearly designates this genus, the supposed absence of mantle being nothing more than its extension over the whole length of the animal, so that it cannot be regarded as a distinct portion of the animal, which is the case in the mantle (shield) of *Limax*.

1. Philomycus sallei.

Tebennophorus sallei, Crosse & Fisch. in Journ. de Conch. xvii. p. 190 (1869) [1]; Miss. Scient. Mex., Mollusca, i. p. 191, t. 9. figg. 6 (animal), 7 (jaw), 8–11 (radula) [2].

Unicolorous, greyish. Length about 25 millim.

Hab. E. Mexico: Playa Vicente, State of Vera Cruz (*Sallé* [1 2]).

2. Philomycus crosseanus.

Tebennophorus crosseanus, Strebel, Beitr. Mex. Land- und Süssw.-Conch. iv. p. 25, t. 10. fig. 6 (animal), t. 9. figg. 13 (radula), 22 (jaw) (1880) [1].

Pale brown, with numerous blackish spots, which unite on each side so as to nearly form a continuous band. Length about 16 millim.

Hab. E. Mexico: locality not indicated (*Strebel* [1]).

3. Philomycus auratus.

Tebennophorus auratus, Tate, Am. Journ. Conch. v. p. 153 (1870) [1].

Yellowish-grey, with numerous small white and gold spots and a few larger black ones, the last forming a black streak on the lateral margin. Length, when extended, 8 inches, breadth 1 inch.

Hab. E. Nicaragua: Javali in Chontales, under stones and on decaying timber, not uncommon (*Tate* [1]).

4. Philomycus costaricensis.

Philomycus costaricensis, Mörch, in Vidensk. Meddelelser Kjöbenh. 1857, p. 341 [1]; Malak. Blätt. vi. p. 109 (1860) [2].

Tebennophorus costaricensis, Binney, Ann. N. York Acad. Sci. i. p. 261, t. 11. figg. M (living animal), N (radula) (1879) [3]; iii. p. 87, t. 8. fig. N (radula) (1884) [4].

Yellowish, feelers, dorsal streak, and scattered spots blackish. Length about 45 millim.

Hab. Central Costa Rica: without nearer indication of locality, at an elevation of 2000 feet (*Œrsted* [1 2]).

Fam. LIMACIDÆ.

Slugs, with a reduced or internal shell. Jaw and radula as in the Fam. Oxygnatha, *anteà*, p. 104.

VELIFERA.

Velifera, Binney, Ann. N. York Acad. Sci. i. p. 257 (1879).

Shell vitrinoid, partly covered by prolonged lobes of the mantle. A simple longitudinal mucous pore at the hinder end of the foot overlapped by a horn-like prominence. Jaw smooth, with median cutting projection. Radula like that of *Zonites*; marginal teeth aculeiform, bifid.

Confined to Costa Rica.

1. Velifera gabbi.

Velifera gabbi, Binney, Ann. N. York Acad. Sci. i. pp. 257, 258, t. 11. figg. A–D (living animal, shell, and radula) [1]; iii. p. 86, t. 2. fig. H (radula) [2].

Shell imperforate, subglobose, very thin, dark greenish-brown, of 3 whorls; greater diameter 6, lesser 5, height 3 millim.; aperture rounded, slightly oblique, with simple peristome, $\frac{3}{4}$ of the height of the shell. Animal greenish, with blackish bandlets at the sides.

Hab. CENTRAL COSTA RICA: flanks of the Pico Blanco, 3000 feet (*Gabb* [1] [2]).

LIMAX.

Limax (Linn.), Férussac, Hist. Nat. Moll. Terr. i. p. 66 (1819); Fischer & Crosse, Miss. Scient. Mex., Mollusca, i. p. 178.

Slug, with internal calcareous, flat (not spiral), somewhat asymmetrical shell inside the mantle (shield), which covers the anterior part of the body; pulmonary orifice on the right side, in the hinder half of the mantle. No caudal mucous pore. Jaw smooth, with median projection. Marginal teeth of the radula spiniform.

Subgen. HYDROLIMAX.

Hydrolimax, Malm, in Göteborgs Vetensk. Samhälles Handl. x. p. 79 (1868); Westerlund, Fauna Moll. Terr. et Fluv. Sueciæ, Norvegiæ, et Daniæ, p. 24 (1873).

Mantle (shield) nearly or quite covering half the length of the body, with faint concentric wrinkles; posterior half of the body not distinctly keeled. Generally unicolorous.

Geographical distribution almost universal.

Prof. H. Simroth unites this division with *Agriolimax*, Mörch, type *L. agrestis*, L., on account of the similarity of the anatomical structure; the external aspect, however, and the water-loving habits of the species induce me to maintain it. The same author states that the reproductive generative faculty begins very early, before the animal is full-grown, and he has found several specimens, from Germany, Guatemala, and Madagascar, on anatomical examination to have well-developed female organs, but no male ones (perhaps proterogyne).

1. Limax lævis.

Limax *lævis*, O. Fr. Müll. Verm. Terr. et Fluv. ii. p. 1 (1774) [1]; Jeffr. Brit. Conch. v. p. 156 [2]; Westerl. Fauna Moll. Terr. Sueciæ, Norveg. et Daniæ, p. 24 [3]; Lehmann, Lebende Schneck. und Muscheln Stett. p. 42, t. 8. fig. 10 (anatomy) (1873) [4].

Agriolimax *lævis*, Simroth, Zeitschr. f. wiss. Zool. xlii. pp. 22, 222, 327, t. 7. fig. 17 (anim.), t. 9. figg. 16–22 (anatomy) [5]; Jahrb. Deutsch. malak. Ges. xiii. p. 30 (1886) [6].

Limax *brunneus*, Draparn. Hist. Nat. Moll. Terr. et Fluv. Fr. p. 128 (1805) [7]; Forbes & Hanley, Hist. Brit. Moll. iv. p. 20, i. t. F. F. F. fig. 4 [8]; Heynem. Malak. Blätt. xix. p. 148 (with figure) (1872) [9].

Limax *campestris*, Binney, Proc. Bost. Soc. Nat. Hist. i. p. 52 (1841) [10]; Terr. air-breath. Moll. N. Am. ii. p. 41, t. 64. fig. 3 [11]; Land and Freshw. Shells N. Am. i. p. 66, fig. 108 [12]; Man. Am. Land-Shells, p. 237, fig. 257 [13]; Proc. Acad. Phil. 1875, p. 176, t. 4. figg. 5 *a*, *b*, *c*

(radula) [14]; Leidy, in Binney's Terr. air-breath. Moll. N. Am. i. p. 250, t. 2. figg. 5, 6 (anatomy) [15]; Jeffr. Ann. & Mag. Nat. Hist. (4) x. p. 245 (1872) [16].

Limax parvulus, Normand, Descr. de Six Limaces Nouv. p. 8 (Valenciennes, 1852) [17].

? *Limax* (*Megapelta*) *semitectus*, Mörch, Journ. de Conch. vi. p. 282, t. 10. fig. 7 (1857) [18]; Malak. Blätt. vi. p. 111 (1859) [19]; Binney, Ann. N. York Acad. Sci. i. p. 260, t. 11. figg. O (anim.), P (jaw), Q (radula) (1879) [20].

Limax guatemalensis, Crosse & Fisch. Journ. de Conch. xviii. p. 297 (1870) [21]; Miss. Scient. Mex., Mollusca, i. p. 181, t. 9. figg. 1 (anim.), 2, 3 (internal shell), 4, 5 (radula) [22].

? *Krynickia americana*, Tate, Am. Journ. Conch. v. p. 154, t. 16. fig. 1 (1870) [23].

Limax (*Malacolimax*) *brasiliensis*, Semper, Reis. Archip. Philipp., Land Moll. ii. p. 84, t. 11. fig. 20 (radula) (1873) [24]; Ihering, Jahrb. malak. Ges. xii. p. 204 (1885) [25].

Limax argentinus, Strebel, Materiali Malac. Argent. Merid. p. 6 (1874) [26].

Limax hyperboreus, Westerl. Sibir. Land- och Sötv.-Moll. (K. Sv. Ak. Handl. xiv. no. 12) p. 21 (1876–77) [27].

Limax stenurus, Strebel, Beitr. Mex. Land- und Süssw.-Conch. iv. p. 21, t. 9. figg. 11 (radula), 15 (jaw), t. 10. figg. A (genitalia), B (anim.), C (shell), D (sole of the foot) (1880) [28]; Ihering, Jahrb. malak. Ges. xii. p. 213 [29].

Agriolimax lacustris, Lessona & Pollonera, Monogr. Limacidi Ital. [Atti Accad. Torino (2) xxv.] p. 47 (1882) [30].

Generally dark brown or even black, rarely and only on more dry places pale brownish, unicolorous, with pellucid slime, faintly wrinkled and ridged, appearing smooth at first sight. Length 14–18, even to 25 millim.

Hab. North America: New England to S. Carolina [10–13 15]; Colorado (*Limax montanus*); California [15].

E. Mexico: exact locality not indicated (*Strebel* [28]).

Central Guatemala: Plateau of Totonicapam (*Bocourt* [21 22]); Guatemala city, in moist spots and under stones, on the sides of the barrancas (ravines), &c., not rare (*Stoll*).

W. Guatemala: Antigua, at an elevation of 4500 feet above the sea (*Stoll*).

E. Nicaragua: Javali in Chontales, under stones and about houses, not uncommon (*Tate* [23]).

E. Costa Rica: Borubeta, on the Rio Uren, at an elevation of 2500 feet above the sea, on plantain leaves and stalks (*Gabb* [20]); Costa Rica, without nearer indication of locality (*Œrsted* [19]).

South America to the Argentine Republic.

Antilles: Puerto Rico.

Distribution almost universal: in Europe extending from Scotland [8], Norway, Central Sweden, Finland, and Russia (Moscow) through France [3 17] and Germany [5 9] to the Pyrenees [2] and Piedmont [30]; also known from Siberia—from the banks of the River Yenisei, 70° N. lat. [27], and Bering Island [5],—Africa, Madagascar [5], &c. In South America it has been found in the woods of the Province of Rio Grande do Sul [24 25] and in Argentina, 32°–35° S. lat., at an elevation of 900 metresa bove the sea, near the limits of Chile [26].

This species prefers the immediate neighbourhood of water—lakes in the plains and small streams or rivers in mountainous regions. Tate [23] remarks that it is nocturnal and can suspend itself by its mucus; this last-mentioned habit has also been observed by Normand [17] and is common to several other species of *Limax* (*cf.* v. Martens, Zool. Anzeiger, 1878, p. 249). I follow Jeffreys [16], Prof. H. v. Ihering [29], and Prof. H. Simroth [5 6] (the principal authority on the systematic arrangement of the slugs at the present time) in placing *L. campestris*, *L. stenurus*, *L. brasiliensis*, *L. argentinus*, and *L. hyperboreus* under the European *L. lævis*, and I am also obliged to include with it the Costa Rican *L. semitectus*, and the Nicaraguan *Krynickia americana*, the descriptions and figures of these forms offering no remarkable difference. Concerning *L. guatemalensis*, I have sent some specimens collected by Dr. O. Stoll to Prof. H. Simroth, and he found them on anatomical examination to be identical with *L. lævis*.

In spite of its very wide distribution, it is not probable that this species has been introduced into foreign lands by commerce, as was the case with *L. variegatus*, Drap., the favoured haunts of which are cultivated localities. At least this is the opinion of Professors v. Ihering and Simroth. Nevertheless, the accounts of its mode of capture in Nicaragua and Costa Rica, as given by R. Tate [23] and Gabb [20], are well compatible with the hypothesis of introduction.

2. **Limax jalapensis.**

Limax jalapensis, Strebel, Beitr. Mex. Land- und Süssw.-Conch. iv. p. 22, t. 10. figg. 5 A, B (living animal, C (shell) (1880) [1]; Ihering, Jahrb. malak. Ges. xii. p. 216 (1885) [2].

Reddish-brown, with some black spots on the mantle. Length 23 millim.

Hab. E. MEXICO: Jalapa, on plants (*Strebel* [1]).

According to Strebel and Prof. H. v. Ihering this species appears to be very nearly allied to the preceding.

3. **Limax berendti.**

Limax berendti, Strebel, Beitr. Mex. Land- und Süssw.-Conch. iv. p. 22, t. 9. fig. 10 (radula), t. 10. figg. 4 A (shell), B (mantle), t. 15. fig. 3 (jaw) [1]; Ihering, Jahrb. malak. Ges. xii. p. 214 (1885) [2].

Greyish-brown, hinder part with very numerous close-set blackish spots. Internal shell rather quadrangular, with an elevated longitudinal line, thick, on the lower side not concave, but uneven, tuberculate (perhaps not normal?). Length about 14 millim.

Hab. N. GUATEMALA: Coban, in a garden (*Berendt* [1]).

4. **Limax cobanensis.**

Limax cobanensis, Crosse & Fisch. in Journ. de Conch. xx. p. 159 (1872) [1].

Brownish, paler at the sides, mantle reddish. Internal shell oval, narrowed in front. Length 40 millim.

Hab. N. GUATEMALA: Coban, in shady places (*Morelet* [1]).

Fam. VERONICELLIDÆ.

No shell. Mantle extending over the whole length of the body and considerably overlapping the foot at the sides, coriaceous. Pulmonary and anal orifices at the hinder end of the body, almost median, but a little to the right side. Lower feelers bifid. Jaw arched, ribbed. Teeth of the radula subquadrate; median narrow, one-cusped; laterals also one-cusped, rather blunt.

VERONICELLA.

Veronicella, Blainville, Journ. de Physique, 1817, p. 440, t. 2. figg. vi. 1, 2 (copied in Férussac's Hist. Nat. Moll. Terr. t. 7. figg. 6, 7); Stoliczka, Journ. Asiat. Soc. xlii. 2, p. 33 (1872); Binney, Land and Freshw. Shells N. Am. i. p. 303; Man. Am. Land-Shells, p. 414.

Vaginulus, Férussac, Tabl. Syst. Moll., Prodr. p. 13 (1821) (first reliable description); Pfeffer, in Strebel's Beitr. Mex. Land- und Sussw.-Conch. v. p. 126.

Vaginula (Fér.), Fischer & Crosse, Miss. Scient. Mex., Mollusca, i. p. 671.

Breadth of the animal considerably exceeding the height; fore and hind extremity rounded.

Circumtropical, extending northward to San Francisco (California) and Florida, southward to Chile, Buenos Ayres, Natal, and Queensland.

Blainville's description is erroneous in one point, the pretended rudimentary shell, but all the rest is correct, even to the position of the pulmonary orifice, and his figures clearly show what genus is meant. The species can scarcely be distinguished without anatomical examination; but as I have no opportunity to do this, I merely describe the sculpture and colour of the mantle and the size of the body in each species, in the author's own words.

1. Veronicella mexicana.

Vaginulus mexicanus, Pfeffer, in Strebel's Beitr. Mex. Land- und Süssw.-Conch. v. p. 130, t. 19. figg. 1–8 (radula), 9 (animal), 10, 11 (jaw), 13–19, 21, 23, 26, 27 (anatomical particulars) (1882) [1].

Finely wrinkled above, brownish-red, or grey-brown or blackish-brown, with a light blackish median, and on each side a lateral blackish longitudinal band; black tubercles scattered on the back. Length about 50 millim., breadth 18.

Hab. E. Mexico: without nearer indication of locality (*Strebel* [1]).

2. Veronicella moreleti.

Vaginula moreleti, Crosse & Fisch. in Journ. de Conch. xx. p. 59 (1872) [1]; Fischer in Nouv. Arch. du Mus. vii. p. 168, t. 11. figg. 5, 6 (1872) [2]; Journ. de Conch. xxiii. p. 54 [3]; Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. p. 682, t. 24. figg. 14, 14 *a* (figure drawn from the living animal by A. Morelet) [4].

Greyish-brown, a feebly marked blackish longitudinal band on each side, with elevated pale granules on the back. Upper feelers pinkish-brown, lower feelers pale grey. Length 90 millim.

Hab. S.W. Mexico: Cacoprieto, on the Isthmus of Tehuantepec (*Sumichrast* [4]).
S.E. Mexico: Palenque, State of Tabasco (*Morelet* [1 4]).
Yucatan: Carmen I. (*Morelet* [1 4]).

Fischer and Crosse lay stress on the circumstance that the hinder extremity of the body is not confounded with the foot (plan locomoteur), but is produced in the form of a caudal appendage, which is extended considerably beyond the foot when the animal is in motion. In Morelet's figure, however, the hinder point of the foot appears to extend beyond the rounded hinder end of the mantle.

3. **Veronicella stolli,** sp. n. (Tab. XIX. figg. 13, 14.)

Chestnut-brown, with yellow and black not very close-set dots and a median narrow yellow longitudinal band, finely and equally shagreened, 25 millim. long, 6 broad. Mantle narrower in front than behind; upper feelers 3 millim. long, blackish-grey; lower feelers scarcely 1 millim. long, conical, with blunt appendage; lower surface of the mantle whitish, in the two posterior thirds of its length finely grey-marbled and with few black dots.

Hab. W. Guatemala: Retalhuleu, in cacao-gardens, under putrid wood and decayed bark of rotten shrubs (*Stoll*).

Although I cannot give anatomical particulars, I venture to name this form from the description and figure made by Dr. O. Stoll during his residence in Guatemala. He remarks that, when the animal is reposing, the feelers are concealed within a quadrangular transverse excavation at the lower side of the mantle (which may be the case in all the species of the genus), and that the palpitation of the heart can be seen in the living animal on the right side at one-third of the length of the body.

4. **Veronicella floridana.**

Vaginulus floridanus, Binney, Terr. air-breath. Moll. N. Am. ii. p. 17, t. 67 (1851) [1]; Leidy, op. cit. i. p. 251, t. 4 (anatomy) [2].

Veronicella floridana, Binney, Land and Freshw. Shells N. Am. i. p. 305, figg. 541, 542 [3]; Terr. air-breath. Moll. N. Am. v. pp. 241, 243 [4]; Man. Am. Land-Shells, p. 446 [5]; Tate, Am. Journ. Conch. v. p. 15 [6].

Very slightly wrinkled, dark ashy-grey, mottled with black, with a median whitish line, on each side of which is an ill-defined black stripe; beneath drab-coloured. Length 56, breadth 18 millim.

Hab. North America: Florida.
E. Nicaragua: Javali in Chontales, under stones; probably also at Toro Rapids (*Tate* [4 5 6]).

5. **Veronicella olivacea.**

Veronicella olivacea, Stearns, Proc. Bost. Soc. Nat. Hist. 1871 (or Conchological Memorandum, no. viii.), p. 1 [1]; Fisch. Journ. de Conch. xxiii. p. 54 (1879) [2]; Binney, Terr. air-breath. Moll. N. Am. v. p. 243 [3]; Bull. Mus. Comp. Zool. xi. no. 8, p. 150 [4]; Man. Am. Land-Shells, p. 160 [5].

Granularly rugose; colour olive beneath, darker olive above. Length 44, breadth 12 millim.

Hab. North America: on the coast of San Francisco Bay, California [4 5].
E. Nicaragua, several specimens (*J. A. McNiel* [1 2 3 5]).

Binney expressly states [3] that this is distinct from the preceding species.

BASOMMATOPHORA.

Fam. AURICULIDÆ.

Shell rather solid, with one or several transverse plaits on the columella. Only one pair of feelers; eyes placed behind them. Teeth of the radula in waved rows.

The great majority of the species of this family are submarine, living exclusively on the sea-coast, very near to or even in salt-water; they will be dealt with at the end of this volume. Only one genus, the following, is truly terrestrial.

CARYCHIUM.

Carychium, O. F. Müller, Verm. Terr. et Fluv. ii. p. 121 (1774); Forbes & Hanley, Hist. Brit. Moll. iv. p. 198; Jeffreys, Brit. Conch. i. p. 300; Binney, Land and Freshw. Shells N. Am. ii. p. 6.

Very small, white, unicolorous, ovate-oblong; peristome thickened, with revolving plait on the columella, and 1–2 teeth on the outer and lower margin. Widely distributed in Europe and North America.

1. Carychium exiguum.

Pupa exigua, Say, Journ. Acad. Phil. ii. p. 375 (1822) [1]; Binney, Complete Writings of Say, p. 7 [2]; A. Gould, Bost. Journ. Nat. Hist. iii. p. 398, t. 3. fig. 20 [3].

Carychium exiguum (Say), Pfr. Monogr. Auric. p. 165 [4]; Frauenfeld, Verh. zool.-bot. Ges. Wien, iv. p. 10, t. 1. fig. 1 [5]; Binney, Land and Freshw. Shells N. Am. ii. p. 6, figg. 5–9 (shell, animal, and radula) [6]; Pilsbry, Proc. Acad. Phil. 1891, p. 319, t. 14. figg. 1–3, and t. 15. fig. 16 (plait) [7].

Hab. Eastern North America: from Maine to S. Carolina and Texas [6 7].

Var. *mexicanum*. (Tab. XIX. figg. 15, 16.)

Carychium exiguum, var. *mexicanum*, Pilsbry, loc. cit. p. 318, t. 11. figg. 7–9 [8].

Somewhat more cylindrical; outer margin of the aperture thick, expanded, with a very obtuse dentiform prominence; lower margin with a still more obtuse faint projection. Long. 1·8, diam. 0·8, apert. 0·7 millim. Whorls $4\frac{1}{2}$.

a.	Long. 1·8,	diam. 0·8;	apert. long.	0·7,	lat.	?	millim.
b.	„ 1·7,	„ 0·7;	„	0·6,	„	0·57	„
c.	„ 1·7,	„ 0·7;	„	0·5,	„	0·54	„

a. Dimensions given by Pilsbry; *b* and *c*. Stoll's specimens.

Hab. E. Mexico: Orizaba (*Heilprin* [8]).
W. Guatemala: Hacienda Helvetia, in Upper Cholhuitz, Costa Cuca (*Stoll*).

Var. *costaricanum*, n. (Tab. XIX. figg. 17, 18.)

Somewhat more inflated, the breadth of the shell being nearly equal to half its length; aperture resembling that of the var. *mexicanum*.

Long. 2·12, diam. 1; apert. long. 0·8, lat. 0·7 millim.
„ 2, „ 0·9; „ 0·8, „ 0·7 „

Hab. Central Costa Rica: San José (*Biolley*).

B. *SPECIES FLUVIATILES.*

GASTROPODA PULMONATA.

Fam. LIMNÆIDÆ.

Air-breathing freshwater mollusks, generally with thin unicolorous shell, the aperture of which is thin-edged. General form of the shell very different in the monotypic genera. Only one pair of feelers; eyes at the inner side of their base. No operculum. Sexes united.

PHYSA.

Bulinus, O. F. Müller, Der Naturforscher, xv. p. 1 (1781).
Physa, Draparnaud, Hist. Nat. Moll. Terr. et Fluv. Fr. p. 52 (1805).
Bullinus, Oken, Lehrbuch d. Naturg. iii. p. 303 (1815).

Shell sinistral, of 3–5 whorls, ovate or oblong, smooth or feebly striate; columellar margin more or less twisted. Feelers long, filiform. Edges of the mantle in most of the species extended beyond the aperture of the shell, often indented or fringed. Teeth of the radula pectinated.

The typical European species of *Physa* (*P. fontinalis* and *P. hypnorum*) agree *inter se* in the very glossy surface of the shell and the simple thin edge of the aperture; but the edges of the mantle are extended and fringed in *P. fontinalis*, and simple and not extended in *P. hypnorum* (subgen. *Aplecta*). In Mexico and Central America there are also species with glossy surface, with extended and with simple mantle, as well as others agreeing with *P. fontinalis* in the extended indented mantle and the very convex whorls, but differing from it in the dull (not shining) surface of the shell, and often also in the thickened lip of the aperture (subgen. *Alampetis*, n.). These latter cannot be confounded, however, with the genus *Isidora*, Ehrenb., which has also a sinistral shell with dull surface, but differs essentially from *Physa* in the very different form of the teeth of the radula.

The genus *Physa* is widely distributed in the temperate zones of both hemispheres, and also in the tropical zone of America; but it has still to be ascertained, by the examination of the radula, whether any true *Physa* inhabits Tropical Africa, India, or Australia, or whether all the so-called *Physæ* of those regions belong to *Isidora*. In

most countries the genus *Physa* is inferior to *Limnæa* in species and individuals, as well as in size; but in Mexico and Central America *Physa* is equal or even superior to *Limnæa* in these respects. Also in Australia the presumed *Physæ* exceed by far the *Limnææ*.

Concerning the name *Bulinus*, see the note under the subgenus *Aplecta*.

Subgen. Aplecta.

Aplexa, Fleming, Hist. Brit. Anim. p. 276 (1828); Beck, Index Moll. p. 116 (1837).
Aplecta (emend.), Hermannsen, Ind. gen. Malac. i. p. 65 (1846); Fischer & Crosse, Miss. Scient. Mex., Mollusca, ii. p. 83 (nec Guenée, 1835).
Bulinus (Adanson), H. & A. Adams, Gen. Moll. ii. p. 239 (1858); Binney, Land and Freshw. Shells N. Am. ii. p. 97.

Shell acutely ovate or fusiform, very glossy, smooth or with faint vertical ridges, of a deep orange or brown colour, sometimes with pale vertical streaks; columellar margin of the aperture comparatively short and thick. In the living animal the edges of the mantle are plain, and only a little or not at all extended beyond the margins of the aperture (see Strebel, Beitr. Mex. Land- und Süssw.-Conch. i. t. 6. fig. 25 infra).

This subgenus, the type of which is the European *P. hypnorum*, is now by most authors regarded as a distinct genus, on account of the want of digitations or indentations in the edges of the mantle*. The form of the radula, which I have examined in some Mexican species, is, however, quite like that of the typical *Physæ*, and the differences in the shell are so vague and indistinct that, without a knowledge of the living animal, it is often impossible to say whether a species belongs to *Aplecta* or to *Physa* (see also my remarks under the subgenus *Stenophysa*).

In Mexico and Central America the subgenus *Aplecta* is represented by more numerous and larger species than in any other part of the world.

Bulinus, Adanson, is probably an *Isidora*, a genus which differs essentially from *Physa*, including *Aplecta*, in the very different form of the radula [see Jickeli, Land- und Süssw.-Moll. N.Ost-Afr. p. 200, t. 3. figg. 2–4 (1874)]. Moreover, Adanson's name is ante-Linnean, his work having been published in 1757, a year before the introduction of the regular binomial nomenclature in the tenth edition of Linné's 'Systema Naturæ'; and, further, Adanson's nomenclature differs from the Linnean, as he uses the names of species as distinct simple words, quite independent of those of the genus, just as Buffon did the French names of animals.

1. **Physa maugeræ.** (Tab. XIX. fig. 20.)

Aplexa maugeriæ, Gray, Beck, Index Moll. p. 116 (1837) (sine descr.)[1]; P. Carpenter, Catalogue of Mazatlan Shells in Brit. Mus. p. 180 (1857)[2].
Physa maugeræ, Woodw. Manual of the Mollusca, p. 171 (1851–56)[3]; Sowerby, in Reeve's Conch.

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* ἄπλεκτος, not braided, plaited, or entwined.

Comparative Table of the Species of *Physa*, Subgen. *Aplecta*.

Nomen.	Forma.	Sculptura.	Coloratio.	Aperturæ		Long.	Diam.	Apert.	Patria.
				Margo columellaris.	Long. in long. testæ.				
maugeræ, *Gray*.....	subsaccata, spira acuta, gracili.	leviter striatula, valde nitida.	griseo-fusca, strigis albis.	subarcuatus, albus, superne rufus.	$\frac{3}{10}$	mm. 34–40	mm. 16–19	mm. 25–28	S.E. Mexico, N. Guatemala.
——, var. acutalis, *F. & Cr.*	,,	,,	griseo-fusca, zonulis spir. rufis.	subarcuatus, rufus, basi albus.	$\frac{3}{8}$	30	16	19	E. Mexico.
aurantia, *Carpent.*	saccata, spira breviore, obtusa.	,,	aurantia, ad suturam substrigosa.	arcuatus, albus.	$\frac{3}{4}$	29–35	16–18	22–27	N.W. Mexico.
——, var. glandiformis, *F. & Cr.*	ovata, spira perbrevi, obtusa.	,,	,,	,,	$\frac{4}{5}$	29	17	25	S.W. Mexico.
nitens, *Philippi*.....	glandiformi-ovata, spira conica.	,,	castanea vel fulva.	subverticalis vel leviter arcuatus, albus.	$\frac{2}{3}$–$\frac{3}{5}$	20–31½	10½–16	16½–23¼	E. Mexico.
——, var. gracilenta, *F. & Cr.*	cylindrico-ovata.	,,	flava, interdum strigis pallidis.	leviter arcuatus, albidus.	$\frac{5}{7}$	16½–28	7½–13	11½–20	E. Mexico, N. & Centr. Guatemala.
impluviata, *Morel.*	ventricose ovata, spira acuta.	levissime pliculosa.	corneo-rufescens vel fusca.	leviter arcuatus, supra purpureus.	$\frac{2}{3}$–$\frac{5}{7}$	22–23	12–13	15	S.E. Mexico, Guatemala, Centr. Costa Rica.
——, var. bocourti, *F. & Cr.*	ovata.	,,	aureo-fusca, strigis raris, pallidis.	,,	$\frac{5}{7}$–$\frac{3}{4}$	24–28	11–15	15½–21	Yucatan, Guatemala, Centr. Costa Rica.
——, var. læta, *v. Mart.* ...	subcylindrice oblongo-ovata.	lævis.	aureo-fusca, strigis crebris, flavis.	substrictus, supra purpureus.	$\frac{2}{3}$	24–26	13½–15	20–20½	N. Guatemala.
——, var. gracilior, *v. Mart.*	subanguste ovata.	leviter striatula.	luteo-fusca, strigis raris, albis.	subarcuatus, supra purpureus.	$\frac{2}{3}$	22–23	10–12	15–16	Centr. Costa Rica.
fuliginea, *Morel.*	oblongo-ovata.	striatula.	obscure fusca, sæpe spiratim excoriata.	crassus, infra subverticalis, fuscescens.	$\frac{5}{7}$	14–17	7½–9	10–12	N. & W. Guatemala, Centr. Costa Rica.
——, var. hoffmanni, *v. Mart.*	gracilior, oblongo-ovata.	,,	griseo-cornea.	,,	$\frac{5}{7}$	17–20	8–10	12⅓–14½	N.W. Costa Rica.
——, var. pliculosa, *v. Mart.*	oblongo-ovata.	pliculis latis distinctis.	fulvo-fusca, rarius excoriata.	crassus, infra subverticalis, violascens.	$\frac{5}{7}$–$\frac{2}{3}$	17–19½	8–11	11–15	Centr. & S.W. Costa Rica.
cisternina, *Morel.*	elongato-ovata, spira acuta, gracili.	minute striatula.	rufescenti-fusca.	crassus, infra arcuatus, carneo-livescens.	$\frac{5}{8}$	18–23	9–11	12–15	Yucatan, Centr. Costa Rica.
——, var. minor, *F. & Cr.*.	,,	,,	,,	,,	$\frac{3}{5}$	10–15½	5–8	6⅔–11	Yucatan, Centr. Guatemala.
——, var. ventrosior, *Morel.*	subanguste ovata, spira brevi.	,,	,,	,,	$\frac{2}{3}$	12–15	6½–9	9–11	Yucatan, Guatemala, Centr. Costa Rica.
——, var. gracilis, *F. & Cr.*	fusiformis.	,,	,,	,,	$\frac{5}{8}$	14	6	10	? Yucatan.

Icon. xix., *Physa*, t. 2. fig. 11 (1873) [4]; Clessin, in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, Limnæiden, p. 329, t. 46. fig. 5 (copied from Sowerby) [5].

Physa nitens, var., Strebel, Beitr. Mex. Land- und Süssw.-Conch. i. p. 48, t. 6. figg. 24 *a*, *b* [6].

The most beautiful and the largest species of this genus, characterized by the whitish rays on all the whorls, except the first, by a rather elongate pointed spire, and by the largest diameter being in the lower third of the last whorl, giving to the whole more the shape of a bag (saccata) than of an egg (ovata). The ground-colour is a dark greyish-brown, becoming darker on the upper whorls; at the suture is a yellowish band; interior of the aperture dark purple-brown.

a. Long. 40, diam. 19; apert. long. $27\frac{1}{2}$, lat. 11 millim.
b. „ $39\frac{1}{2}$, „ 18; „ 28, „ 10 „
c. „ 35, „ 16; „ 26, „ 10 „
d. „ 33, „ 16; „ 25, „ 9 „
e. „ 34, „ 16: „ 26, „ 9 „
f. „ $31\frac{3}{4}$ (15 lines).

a. From a specimen in Pätel's collection, now in the Berlin Museum; *b*. Böttger's specimen from Peten; *c*. From the figure given by Sowerby [4]; *d*. According to Strebel [6]; *e*. Second specimen in the Berlin Museum; *f*. According to Woodward [3].

Hab. S.E. Mexico: coast of Tabasco, in swamps (*Dr. Berendt* [6]); Mexico, without nearer indication of locality (*Beck* [1]).

N. Guatemala: in the river Peten, Dept. of Peten, and in a pond at Coban (*Stoll, now in Böttger's collection*).

Woodward [3] calls it a Californian, Carpenter [2] a Caribbean species; Sowerby [4] gives Jamaica as locality.

I have in vain searched in Gray's various writings for a description or figure of this species. The figure given by Binney (Land and Freshw. Shells of N. Am. ii. p. 98, fig. 167) does not agree with my specimens in the proportion of the spire; it seems to have been taken from an individual variation of *P. aurantia*.

Sowerby [4] and Clessin [5] incorrectly attribute the name of the species to Quoy (Voy. 'Astrolabe'). It was given in honour of Miss Mauger, as in *Helicina maugeriæ* (Zool. Journ. i. p. 251).

Var. *acutalis*.

Aplecta nitens, var. *β. acutalis*, Fisch. & Crosse, Miss. Scient. Mex., Mollusca, ii. p. 88, t. 39. figg. 2, 2 *a* [7].

Of the general outline and dark grey-brown colour of *P. maugeræ*, but wanting the white rays. Spire relatively a little longer.

Hab. E. Mexico: Cazones, State of Vera Cruz, on the coast, north of the city of Vera Cruz, near Papantla (*Sallé* [7]).

2. Physa aurantia.

Physa peruviana (Gray), Menke, in Zeitschr. f. Malak. 1850, p. 163 [1].
Aplexa aurantia, P. Carpenter, Catalogue of Mazatlan Shells in Brit. Mus. p. 179 (1857) [2].
Bulinus aurantius, Binney, Land and Freshw. Shells of N. Am. ii. p. 97, figg. 166, 167 (description copied from Carpenter) [3].

Physa aurantia, Sowerby, in Reeve's Conch. Icon. xix., *Physa,* t. 2. fig. 13[4]; Clessin, in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, Limnæiden, p. 269, t. 37. fig. 1[5].

Aplecta aurantia, Fisch. & Crosse, Miss. Scient. Mex., Mollusca, ii. p. 86, t. 30. fig. 2, t. 33. fig. 1[6].

More inflated than the preceding (*P. maugeræ*), with shorter blunt spire; colour almost always orange-brown with a tendency to darker shades, in rays, below the suture (*Carpenter*[2]).

a. Long. 35, diam. 18; apert. long. 27, lat. 15 millim.
b. „ 34, „ $16\frac{1}{3}$.
c. „ 33, „ $17\frac{1}{2}$; „ 26, „ 13 „
d. „ $32\frac{1}{2}$, „ 16; „ $24\frac{1}{2}$, „ 11 „
e. „ 29, „ 16; „ 22, „ 9 „

a. From the figures given by Binney[3]; *b.* From Menke[1]; *c.* From Fischer and Crosse's figure, t. 33. fig. 1[6]; *d.* Measurements given by Fischer and Crosse in the text[6]; *e.* From Sowerby's figure.

Hab. N.W. Mexico: Mazatlan (*H. Melchers*[1]; *Fr. Reigen*[2 3 5 6]).

Var. *glandiformis.*

Aplecta aurantia, var. *glandiformis,* Fisch. & Crosse, loc. cit. p. 86, t. 32. fig. 1[7].

Spire short and blunt, as in the type; general outline more ovate.

Hab. S.W. Mexico: Acapulco (*Sallé*[7]).

3. **Physa nitens.** (Tab. XIX. fig. 19.)

Aplexa suturalis, Beck, Index Moll. p. 117 (1837) (sine descr.)[1].

Physa nitens, Philippi, in Küster, Martini, & Chemnitz, Syst. Conch.-Cab. ed. 2, Limnæaceen, p. 5, t. 1. figg. 1, 2 (1845)[2]*; v. Mart. Malak. Blätt. xii. p. 57 (1865)[3]; Strebel, Beitr. Mex. Land- und Süssw.-Conch. i. p. 49, t. 6. figg. 25 (living animal), 25 *a–f*[4].

Bulinus nitens, Binney, Land and Freshw. Shells N. Am. ii. p. 98, fig. 168 (copied from Küster)[5].

Aplecta nitens, Fisch. & Crosse, Miss. Scient. Mex., Mollusca, ii. p. 88, t. 39. figg. 1, 1 *a,* 1 *b* (the living animal, copied from Strebel)[6].

Aplexa nitens, Pilsbry, Proc. Acad. Phil. 1891, p. 325[7].

Physa conspicua, Uhde, MS. in Mus. Berol.[8].

More oviform than *P. maugeræ* and *P. aurantia,* last whorl about equally convex above and beneath; spire moderate, pointed. Colour dark brown, with a whitish band near the suture (*Philippi*[2]), clear or deep chestnut-brown (fading after death), with a reddish and often also a whitish band near the suture (*Strebel*[4]). In some specimens (as in the one found by Uhde) a few white rays are visible on the last two whorls.

a. Long. 26, diam. 14; apert. long. $18\frac{1}{2}$, lat. $8\frac{1}{2}$ millim.
b. „ $31\frac{1}{2}$, „ 15; „ $23\frac{1}{4}$, „ 9 „
c. „ 30, „ $13\frac{3}{4}$; „ 24, „ 9 „
d. „ 29, „ 16; „ 22, „ 9 „
e. „ $25\frac{1}{2}$, „ 12; „ $19\frac{1}{2}$, „ $6\frac{3}{4}$ „
f. „ 20, „ $10\frac{1}{2}$; „ $14\frac{1}{2}$, „ $5\frac{1}{2}$ „

a. From the figure of Philippi's type[2]; *b.* From a specimen collected by Uhde, in Mus. Berol.[8] (Strebel, fig. 25 *e*); *c* and *f.* Measurements of individual variations given by Strebel[4]; *d.* Fischer and Crosse's specimen of *A. nitens*[6]; *e.* Specimen in the collection of the late Albers.

Hab. E. Mexico: Vera Cruz, in ditches, and the larger ones in puddles[4] (*Uhde*[3 8];

* Pp. 1–28 and tabb. 1–4 of this Monograph were edited by Küster, under the title "Limnæaceen"; the remainder was dealt with by Clessin under the title "Limnæiden." Pp. 21–28 were published in 1850 (*cf.* Troschel, Archiv f. Naturg. xvii. 2, pp. 101, 128); pp. 1–20 very probably before 1846 (*cf.* Troschel, ibid. xii. 2, p. 414).

Strebel [4]); San Juan, near Vera Cruz (*Heilprin* [7]); Jalapa (*Höge*); Mexico, without nearer indication of locality [2 5].

Yucatan (*Philippi, in coll. Dunker*).

Fischer and Crosse's figure of *Aplecta nitens* represents the most ventricose specimen I have ever seen.

Strebel [4] mentions subfossil specimens of 33 millim. in length, and Fischer and Crosse [6] figure (t. 39. fig. 3) a subfossil example from Vera Cruz, which measures 36 millim., but approaches in its outlines *P. maugeræ*.

Var. *gracilenta*.

Physa nitens, schlankere form, Strebel, loc. cit. p. 49, t. 6. figg. 25 *b*, *c* [9].

Aplecta aurantia, var. δ. *gracilenta*, Fisch. & Crosse, loc. cit. p. 37, t. 39. figg. 4, 4 *a* [10].

Diameter less than one-half of the whole length of the shell. Colour paler yellow, often with white rays.

a. Long. 28, diam. 13; apert. long. 20, lat. 7 millim.
b. „ $25\frac{1}{2}$ „ 12; „ $19\frac{1}{2}$, „ $6\frac{1}{2}$ „
c. „ $18\frac{1}{2}$ „ $8\frac{1}{2}$; „ 13, „ 5 „
d. „ $16\frac{1}{2}$ „ $7\frac{1}{2}$; „ $11\frac{1}{2}$, „ 4 „

a. Measurements by Fischer and Crosse [10]; *b* and *d*. by Strebel [9], as individual variations of *P. nitens*; *c*. Taken from a specimen collected at Tejeria by Höge.

Hab. E. Mexico: Vera Cruz, found with typical specimens (*Strebel* [9]); Tejeria, several specimens, one 27 millim. long, all the others about the same size, and varying a little in the comparative diameter, some with a few white rays (*Höge*).

N. Guatemala: Coban (*Bocourt* [10]).

Central Guatemala: San Antonio, north of the city of Guatemala (*Stoll*).

4. **Physa impluviata.** (Tab. XX. fig. 1.)

Physa impluviata, Morelet, Test. Noviss. i. p. 18 (1849) [1].

Aplecta impluviata, Fisch. & Crosse, Miss. Scient. Mex., Mollusca, ii. p. 91, t. 30. fig. 3, t. 39. fig. 5 [2].

Physa purpurostoma, Tristram, P. Z. S. 1861, p. 231 [3].

Aplecta purpurostoma, Fisch. & Crosse, loc. cit. p. 90 [4].

Physa nitens (Philippi), v. Mart. P. Z. S. 1875, p. 649 [5].

The most ventricose of the medium-sized species of the subgenus *Aplecta*, with somewhat broad, but very flat and faint striæ; columellar margin straight, rather thick, well distinct from the very convex bulk of the last whorl, somewhat dark purple above, white in the middle and below.

Long. 22–23, diam. 12–13; apert. long. 15, lat. $6\frac{1}{2}$ millim.

Hab. S.E. Mexico: Tabasco (*Sallé* [2]).

N. Guatemala: Coban, in a pond (*Stoll*).

Central Guatemala: Guatemala city, in small streams (*Morelet* [1 2]).

W. Guatemala: from a small stream running into the lake of Dueñas, above Santiago Zamora (*Salvin*, Aug. 1873 [5]); Lake of Dueñas (*Salvin* [3 4]); Dueñas, in pools near the lake (*Stoll*); Capetillo, a little below Antigua in the valley between the Volcan de Agua and Volcan de Fuego (*Champion*).

Central Costa Rica: San Francisco de los Rios, near San José (*Pittier*).

Fischer and Crosse [2] figure an example with two dark spiral bands. A specimen found at Capetillo by Mr. Champion shows several narrow whitish spiral bands near the base of the shell. Younger examples from Santiago Zamora [5] are remarkably slender: long. 18, diam. 9, apert. 14 millim.

Concerning the identification of *P. purpurostoma* with *P. impluviata*, I have before me a specimen collected by Dr. O. Stoll at Dueñas which agrees exactly with the description and measurements given by Canon Tristram [3]. Salvin, however, has sent me some others, under the name *P. purpurostoma*, from the first collection made at the lake of Dueñas, which are much smaller, narrower, and pale coloured; I regard these as a variety of *P.* (*Stenophysa*) *spiculata*.

Var. *bocourti*.

Aplecta, sp., Stoll, Guatemala, Reisen und Schilderungen, 1886, p. 33 [6].

Physa influviata (Morelet), Sowerby, in Reeve's Conch. Icon. xix., *Physa*, t. 2. fig. 16 [7]; Clessin, in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, Limnæiden, p. 330, t. 46. fig. 2 (copied from Sowerby) [8].

Aplecta aurantia, var. *bocourti*, Fisch. & Crosse, Miss. Scient. Mex., Mollusca, ii. p. 86, t. 30. figg. 1, 1 *a* [9].

Physa fuliginosa (Morelet), Biolley, Moluscos terr. y fluv. de Costa Rica, p. 17 [10].

Comparatively larger, with more prolonged spire than in the type, thus approaching *P. nitens*; colour golden-brown or chestnut-brown, some specimens with paler streaks; inside the aperture dark brown, and the columellar margin somewhat purple at its upper end, as in typical *P. impluviata*.

a.	Long. 28,	diam. 15;	apert. long. 21,	lat. 9 millim.
b.	„ 24,	„ 11;	„ $15\frac{1}{2}$,	„ 7 „
c.	„ 25,	„ 12;	„ 17,	„ 7 „

a. Fischer and Crosse's measurements; *b.* From Sowerby's figure; *c.* Costa Rican specimen from Uruca.

Hab. Yucatan: Palizada (*Bocourt* [9]).

N. Guatemala: Coban (*Bocourt* [9]).

Central Guatemala: Laguna of Naranjo and at San Antonio near the city of Guatemala (*Stoll* [6]).

W. Guatemala: Dueñas, in the marshes around the lake (*Stoll*).

Central Costa Rica: La Uruca, near San José, in a pond (*Biolley* [10]).

Somewhat variable in form and colour, but, so far as I can judge, inseparable from the typical form of *P. impluviata* by any certain character. Sowerby [7] figures a specimen with unusually long spire; his spelling "*influviata*" is most probably a misunderstanding, or a supposed correction of *impluviata*. This name, given by Morelet, is derived from the Latin word "impluvium," a reservoir of water or cistern in the atrium of an old Roman house, referring to "pluvia," rain, not to "fluvius."

Var. *læta*, n. (Tab. XX. figg. 2, 3.)

Physa aurantia (Carp.), Tristram, P. Z. S. 1863, p. 412 [11].

Rather large and solid, somewhat more cylindrical than in the type, of a vivid golden-brown colour, with

numerous yellow streaks, some of which are comparatively broad and even confluent. Inside of the aperture and columellar margin as in typical *P. impluviata*.

Long. 26, diam. 15; apert. long. $20\frac{1}{2}$, lat. $8\frac{1}{2}$ millim.
„ 24, „ $13\frac{1}{2}$; „ 20, „ 8 „

Hab. N. Guatemala: Vera Paz (*Salvin* [11]).

This form is almost intermediate between *P. impluviata*, var. *bocourti*, and *P. nitens*, var. *gracilenta*. The comparative breadth of the shell in relation to its length is somewhat variable also in this form, as may be seen by the two figures here given.

Var. *gracilior*, n.

More narrow in comparison with its length, whorls less convex, sometimes even subangulated a little below the suture; yellowish-brown, some specimens with a few narrow white rays; columellar margin nearly straight, thick, white, above somewhat purplish.

Long. 22, diam. $10\frac{1}{2}$; apert. long. 15, lat. 6 millim.
„ 22, „ 10; „ 15, „ 6 „
„ 23, „ 12; „ 16, „ $6\frac{1}{3}$ „

Hab. Central Costa Rica: environs of San José (*Biolley*); Costa Rica, without nearer indication of locality (*Karl von Seebach, in Mus. Berol.*).

Beck [Index Mollusca, p. 116 (1837)] mentions an *Aplecta ventricosior* from Panama, without description; but I have not been able to obtain any information about it, even from the conchologist of the Copenhagen Museum. To judge from the name, it may perhaps be referable to *P. impluviata*.

5. Physa fuliginea.

Physa fuliginea, Morelet, Test. Noviss. ii. p. 16 (1851) [1].
Aplecta fuliginosa (Morelet), Fisch. & Crosse, Miss. Scient. Mex., Mollusca, ii. p. 89, t. 30. figg. 5, 5 *a* [2].

Darkish brown, with rather short spire; columellar margin thick, somewhat twisted, brownish.
a. Long. 17, diam. 9; apert. long. 12, lat. 5 millim.
b. „ 14, „ $7\frac{1}{2}$; „ 10, „ 4 „
a. Measurements given by Morelet and Fischer and Crosse; *b*. Smaller specimen from among those in Morelet's collection.

Hab. N. Guatemala: San Miguel Tucuru (*Bocourt* * [2]).
W. Guatemala: Antigua, in small streams (*Morelet* [1 2]).
Central Costa Rica: Cartago and San José (*Biolley, in Muss. Berol. and Neuchâtel*).

Var. *hoffmanni*, n. (Tab. XX. figg. 5, 5 *a*, *b*.)

Physa nitens, var. *minor*, Strebel, Beitr. Mex. Land- und Süssw.-Conch. i. p. 50, t. 6. fig. 25 *f* [3].
Pale greyish-horn-colour, somewhat narrower than the type.

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* Given by Bocourt as San Miguel Tucusan, no doubt in error for San Miguel Tucuru, in the Polochic Valley.

a. Long. 20, diam. 10; apert. long. 14½, lat. 6 millim.
b. „ 19½, „ 9; „ 14, „ 5⅓ „
c. „ 17, „ 9; „ 12⅓, „ 5½ „
d. „ 17, „ 8; „ 13, „ 4½ „
All the measurements from specimens from the same locality.

Hab. N.W. Costa Rica: Laguna Redonda, near Candelaria (*C. Hoffmann*, 1856, *in Mus. Berol.*[3]).

Of this form there are numerous specimens in the Berlin Museum.

Var. *pliculosa*, n. (Tab. XX. figg. 11, 11 *a*, 12.)

Physa aurantia (Carp.), Biolley, Moluscos terr. y fluv. de Costa Rica, p. 17 (part.)[4].

Somewhat larger than the type, with very distinct broad vertical plaits on the last whorl.
a. Long. 19½, diam. 11; apert. long. 15, lat. 6 millim.
b. „ 19, „ 10; „ 14, „ 5½ „
c. „ 17, „ 10; „ 13, „ 5½ „
d. „ 17, „ 9½; „ 13, „ 5 „
e. „ 17, „ 8; „ 11, „ 5½ „
a–d. Measurements taken from specimens from the same locality, Reventazon River; *e.* Specimens from the Rio Torres.

Hab. Central Costa Rica: in all the rivers near San José, as Virilla, Torres, Maria Aguilar, and Tiribi, and in all smaller streams, by which it is carried into every pool during the rainy season; also at Cartago, and in the Rio Reventazon, at Ujarras (*Biolley*[4]); Costa Rica, without nearer indication of locality (*Van Patten, in Mus. Berol.*).
S.W. Costa Rica: Picada de "Senaba," probably in error for Terraba (*Fulton*).

This form often shows spiral scratches on the outside of the last whorl; these are also mentioned in Morelet's diagnosis of *P. fuliginea*, but they are not visible in all specimens, even in some of those obtained from Morelet himself. Some examples have a large number of scratches extending over nearly the whole of the last whorl, from the suture to the base. In the varieties from Costa Rica they are present only in the minority of specimens and not very numerous.

According to a MS. note by Biolley, the var. *pliculosa* is found on stones, in a strong current, in the Rio Torres.

6. **Physa cisternina.**

Physa cisternina, Morelet, Test. Noviss. ii. p. 15 (1851)[1]; Biolley, Moluscos terr. y fluv. de Costa Rica, p. 17[2].

Aplecta cisternina, Fisch. & Crosse, Miss. Scient. Mex., Mollusca, ii. p. 94, t. 30. fig. 7[3].

Rather variable in outline, of dull brown colour, spire broadly conical; aperture widened below, columellar margin thick, callous, purple or brownish, rather short, turning arcuately into the basal margin.
a. Long. 23, diam. 11; apert. long. 15, lat. 6 millim.
b. „ 18, „ 9; „ 12, „ 4½ „
a. Morelet's specimen; *b.* One of Biolley's specimens.

Hab. Yucatan: in cisterns and small streams in the suburbs of Merida (*Morelet* [1 3]).
Central Costa Rica: rivers near San José, as Maria Aguilar, Torres, and Virilla (*Biolley* [2]).

Var. *minor*. (Tab. XX. figg. 9, 10.)

? *Physa spiculata* (Morel.), Strebel, Beitr. Mex. Land- und Süssw.-Conch. i. p. 56, t. 7. figg. 31, 31 *a*, *b* [4].

Aplecta cisternina, var. *β. minor*, Fisch. & Crosse, loc. cit. p. 94, t. 30. fig. 8 [5].

a. Long. 15, diam. 8; apert. long. 10, lat. 5 millim.
b. „ $15\frac{1}{2}$, „ $7\frac{1}{2}$; „ 11, „ $4\frac{1}{2}$ „
c. „ 14, „ 6; „ $9\frac{1}{3}$, „ $3\frac{1}{2}$ „
d. „ 10, „ 5; „ $6\frac{2}{3}$, „ 2 „
a and *b*. Measurements given by Morelet and Fischer and Crosse; *c* and *d*. Specimens from Uspantan.

Hab. Yucatan: Merida, with the typical form (*Morelet* [5]); Yucatan, in cisterns (*Berendt* [4]); Tabi, near Sotuta (*Godman*).
Central Guatemala: San Miguel Uspantan, Dep. Quiché, in a small stream, and San Antonio, north of the city of Guatemala (*Stoll*).

Var. *ventrosior*.

Physa cisternina, var. *ventrosior*, Morelet, Test. Noviss. p. 15 (1851) [6].
Physa stolli, Clessin, in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, Limnæiden, p. 293, t. 42. fig. 11 (1885) [7].
Aplecta cisternina, var. *γ. abbreviata*, Fisch. & Crosse, Miss. Scient. Mex., Mollusca, p. 95, t. 30. fig. 9 (1886) [8].

a. Long. 15, diam. 9; apert. long. 11, lat. 5 millim.
b. „ 12, „ $6\frac{1}{2}$; „ 9, „ 3 „
c. „ 15–16, „ 8; „ 10, „ 4 „
a. Measurements given by Fischer and Crosse; *c*. by Clessin; *b*. Specimen from Capetillo.

Hab. Yucatan: Merida, with the type and the var. *minor* (*Morelet* [6–8]).
N. Guatemala: Peten and Alta Vera Paz (*Bocourt* [8]).
W. Guatemala: Antigua, in wells within the city (*Stoll, in Mus. Berol.*); Guatemala, without nearer indication of locality (*Stoll* [7]); Capetillo (*Champion*).
Central Costa Rica: Sabana Canal (*Biolley, in Muss. Berol. and Neuchâtel*).

Var. *gracilis*.

Aplecta cisternina, var. *δ. gracilis*, Fisch. & Crosse, loc. cit. p. 95, t. 30. fig. 10 [9].

Long. 14, diam. 6; apert. long. 10, lat. 4 millim.

Fischer and Crosse give no special locality for this variety.

Subgen. Stenophysa, n.

Shell oblong, with flat whorls and pointed apex, very glossy, unicolorous; columellar margin comparatively long and straight, white. Edges of the mantle indented.

Having ascertained that indentations on the edges of the mantle are present in

Comparative Table of the Species of *Physa*, Subgen. *Stenophysa*.

Nomen.	Forma.	Sculptura.	Coloratio.	Aperturæ		Long.	Diam.	Apert.	Patria.
				Margo columellaris.	Long. in long. testæ.				
princeps, *Phillips*	fusiformi-elliptica, infra attenuata.	leviter striatula, nitida.	fusca, strigis albis.	subangulato-arcuatus.	$\frac{5}{7}$	mm. 34	mm. 15	mm. 24	Yucatan.
——, var. pallens, *v. Mart.*	,,	,,	pallide flavescens.	,,	$\frac{5}{7}$	21–23½	10–11	15–17	Yucatan.
elata, *A. Gould*	ovato-fusiformis.	vix striatula, nitida.	pallide cornea.	tenuis, subverticalis, albus.	$\frac{2}{3}$–$\frac{5}{7}$	18–22	9–10	12½–16	Lower Calif. & N.W. Mexico.
panamensis, *Meg.*	subcylindrico-ovata.	minute striatula, minus nitida.	pallide flavescens, substrigosa.	subverticalis, basi arcuatus.	$\frac{2}{3}$	17½	8	13	Panama.
nicaraguana, *Morel.*	ovata, spira brevi.	confertim rugulosa.	pallide fuscescens, albido variegata, apice rufescente.	recedens, tenuis, albus.	$\frac{4}{5}$	26–27	12–13	20	Nicaragua.
spiculata, *Morel.*	ovato-fusiformis, infra angustata.	vix striatula, nitida.	pallide cornea, diaphana.	tenuis, subverticalis, albus.	$\frac{4}{7}$–$\frac{5}{8}$	13–18	5½–8½	9–11	E. Mexico, Yucatan, Centr. & W. Guatemala.
——, var. tapanensis, *F. & Cr.*	ovato-fusiformis.	tenerrime striatula, nitida.	,,	,,	$\frac{2}{3}$	16–18	7–8	9–11	S.W. & S.E. Mexico, Yucatan.
——, var. guatemalensis, *F. & Cr.*	,,	,,	,,	,,	$\frac{2}{3}$	13	7	9	Centr. & W. Guatemala.
——, var. nitidula, *Cless.*	acute ovata.	,,	,,	,,	$\frac{2}{3}$	11	5	6½	Honduras.
bullula, *Cr. & F.*	anguste ovata.	striatula, nitida.	,,	leviter tortus, sat tenuis, albus.	$\frac{2}{3}$	16	9	13	E. Mexico.
obtusa, *Cless.*	obtuse ovata, spira brevi.	,,	læte flava, sutura alba.	validus, distincte tortus, albus.	$\frac{2}{3}$	13–14	7–8	10½	Honduras.

spirit-specimens of *P. sowerbyana*, d'Orb., I am compelled to separate the very closely allied *P. spiculata*, Morelet, from the subgenus *Aplecta*, in which it has been placed by Fischer and Crosse, and to include it in the new subgenus *Stenophysa*, the type of which is the Antillean *P. sowerbyana*.

In the form of the shell the Mexican and Central-American species here referred to the subgenus *Stenophysa* are very like *Aplecta*, but may be distinguished by their paler colour, more narrow form, and the comparatively long and thin columellar margin of the aperture.

7. **Physa princeps.**

Physa princeps, J. S. Phillips, Proc. Acad. Phil. iii. p. 66, t. 1. fig. 11 (1846) [1].

Of the size and colours of *P.* (*Aplecta*) *maugeræ*, but much more narrowed downwards, the whole outline and that of the aperture being fusiform-elliptical; columellar margin very short, somewhat twisted and receding, forming a distinct angle with the basal margin.

Long. 34, diam. 15; apert. long. 24, lat. 9 millim. Whorls 5–6.

Hab. YUCATAN (*Norman* [1]).

This species is only known to me from the quoted description and figure; it cannot be identified with any of the forms figured in the works of Fischer and Crosse or Strebel, or present in the Berlin Museum.

Var. *pallens*, n. (Tab. XIX. figg. 21, 22.)

Agreeing in general form with the type, but unicolorous, pale yellow, very shining; columellar margin rather thin, white, nearly straight. Aperture $\frac{5}{7}$ of the whole length.

a. Long. $23\frac{1}{2}$, diam. 11; apert. long. 17, lat. 5 millim.
b. „ 21, „ 10; „ 15, „ 5 „

Hab. YUCATAN (*Philippi, in coll. Dunker*).

The systematic position of this species is doubtful, as the form of its mantle-edges is not known, and the coloration resembles that of *P.* (*Aplecta*) *maugeræ*; but judging from the more elongate and attenuate form of the lower part of the shell, and chiefly of the columellar margin, it seems to be best placed in the subgenus *Stenophysa*.

8. **Physa elata.**

Physa elata, A. Gould, Bost. Journ. Nat. Hist. vi. p. 379, t. 14. fig. 4 (1853) [1]; Clessin, in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, Limnæiden, p. 268, t. 37. fig. 15 [2].

Aplexa elata, P. Carpenter, Cat. Mazatlan Shells in Brit. Mus. p. 180 [3]; Fisch. & Crosse, Miss. Scient. Mex., Mollusca, ii. p. 92, t. 32. fig. 2 (*Aplecta*) [4].

Bulinus elatus, Binney, Land and Freshw. Moll. N. Am. ii. p. 99, fig. 169 [5].

Hab. LOWER CALIFORNIA [3].

N.W. MEXICO: Mazatlan, very common (*Fr. Reigen* [1–5]).

To the descriptions given by the above-mentioned authors, I may add that in the

three specimens from Mazatlan contained in the Berlin Museum the columellar margin shows a very short umbilical slit at the under end of its outward expansion of the body-whorl, just as in *P. panamensis* and *P. osculans*; and that the last whorl, even if measured on the side of the aperture to the next upper suture, does not attain $\frac{7}{8}$ of the length of the whole shell, but only $\frac{5}{6}$ or between $\frac{5}{6}$ and $\frac{6}{7}$ (in Binney's figure [5] between $\frac{4}{5}$ and $\frac{5}{6}$, and in Fischer and Crosse's figure [4] $\frac{4}{5}$), or measured on the dorsal side $\frac{3}{4}$ of the whole length or a little less.

This species is very nearly allied to *P.* (*Aplecta*) *peruviana*, Gray [‘Spicilegia Zoologica,’ i. p. 5, t. 6. fig. 10 (1828)], from swamps between Lima and Callao, which, judging from specimens collected by Tschudi in Peru, has the same pale colour, but is of smaller size and has a comparatively somewhat longer spire: long. 16, diam. 7; aperture scarcely 11 millim.

9. **Physa panamensis.** (Tab. XX. fig. 8.)

Physa panamensis, Megerle v. Mühlfeldt, in Anton's Verz. der Conch. p. 49 (1839) [1]; Küster, in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, Limnæaceen, p. 11, t. 2. figg. 3–6 [2].

Shell lanceolate-ovate, rather solid, finely striated and moderately glistening, very pale yellowish, with a few brownish lines of growth, a little more opaquely whitish at the suture; spire acute; whorls nearly six, the uppermost dark reddish-brown, distinct, slightly convex, the last one seen from the dorsal side four-fifths the length of the shell, cylindrical in its middle part, distinctly more attenuated at the base than above near the suture; aperture a little more than two-thirds of the length of the shell, narrow obovate-lunate, rather narrowly rounded at the base; a broad, very distinct callus on the body-whorl, continued downwards into the broad reflexed outward expansion of the columellar margin, fully appressed to the body-whorl, and leaving only a minute slit at its under end; columellar margin unicolorous, white, straight in its greater part, forming a very obtuse angle with the convexity of the body-whorl, and with its lower end bending obliquely towards the basal margin.

Long. $17\frac{1}{2}$, diam. 8; apert. long. 13, lat. 5 millim.

Hab. Panama [1 2].

I have fortunately been able to examine Anton's [1] typical specimen of this species, now in the Zoological Museum of Dresden. It is very like *P. elata* at first sight, but differs, on closer inspection, by the less glossy surface and the paler yellowish colour of the shell, the cylindrical (not elliptical) form of the middle part of the last whorl, and the much more conspicuous callus. The first and third differences may, perhaps, be due to the circumstance that the type of *P. panamensis* has been preserved in a dry state for at least 59 years, and it may have lost its natural lustre, the callus thus becoming more visible; but the difference in form cannot be explained in this manner. From *P. peruviana*, Gray, it distinctly differs in the remarkably shorter and broader columellar margin. In the Berlin Museum there are some very similar specimens from Brazil, which were collected by Moricand in the Province of Bahia; the locality “Panama,” therefore, seems to require confirmation.

10. **Physa nicaraguana.** (Tab. XX. figg. 4, 4 *a*.)

Physa nicaraguana, Morelet, Test. Noviss. ii. p. 16 (1851) [1].

Ovate, with rather short spire; pale brown, with thickly-set whitish vertical wrinkles and sometimes some whitish spiral lines at the base; apex dark reddish. Aperture $\frac{4}{5}$ of the whole length; columellar margin receding, rather thin, white.

Long. 17 (probably in error for 27), diam. 12 millim. (*Morelet*).

Long. 26, diam. 13; apert. long. 20, lat. 7 millim. (from a drawing made by Mr. E. Smith).

Hab. Lake of Nicaragua (*Morelet* [1]).

I am indebted to Mr. Edgar Smith for a drawing of this species, which is not mentioned by either Reeve or Clessin. In the shortness of the spire *P. nicaraguana* somewhat resembles *P. obtusa*, Clessin, but differs from that species in general form and apparently in the less shining surface.

Morelet [1], it may be noted, uses the word "nitida" in his descriptions of the other species of *Physa*, but omits it in his definition of *P. nicaraguana*.

11. **Physa spiculata.**

Physa spiculata, Morelet, Test. Noviss. i. p. 18 (1849) [1]; Sowerby, in Reeve's Conch. Icon. xix. *Physa*, t. 6. fig. 46 [2].

Aplecta spiculata, Fisch. & Crosse, Miss. Scient. Mex., Mollusca, ii. p. 93, t. 27. fig. 13, t. 30. fig. 15 [3].

Aplexa nitens, var. *spiculata*, Pilsbry, Proc. Acad. Phil. 1891, p. 325 [4].

Physa, sp., Strebel, Beitr. Mex. Land- und Süssw.-Conch. i. p. 56, t. 6. fig. 30 [5].

The most turrite of the smaller Central-American *Physæ*, clear yellowish, translucent; columellar margin nearly straight, white, attenuated towards the base; a very distinct small white band at the suture.

a. Long. 18, diam. 8; apert. long. ?, lat. ? millim.
b. „ 17, „ 8; „ 11, „ 8 „
c. „ 17, „ $8\frac{1}{2}$; „ 12, „ 5 „
d. „ 13, „ $5\frac{1}{2}$; „ 9, „ 4 „
e. „ $9\frac{1}{2}$, „ $4\frac{1}{2}$; „ $5\frac{3}{4}$, „ $2\frac{1}{2}$ „

a. Measurements given by Morelet; *b* and *c*. by Fischer and Crosse; *d*. Specimen from Tabi; *e*. Measurement given by Strebel.

Hab. E. Mexico: one calcified specimen found in the sand on the beach at Vera Cruz (*Strebel* [5]); Lagoon of Vera Cruz (*Sallé* [3]).

Yucatan: Campeche, in cisterns in the city (*Morelet* [1 2 3]); Tabi (*Godman*); Merida (*Heilprin* [4]).

Central Guatemala: Plateau of Guatemala (*Bocourt* [3]).

W. Guatemala: Lake of Dueñas (*Salvin*).

Fischer and Crosse [3] distinguish a variety with broader shell (measurements *c*); but the figure which they give for it (t. 30. fig. 15) is rather more fusiform and agrees very well with typical specimens from Morelet's collection, whereas their other figure (t. 27. fig. 13) is somewhat more conical.

Obs.—*Physa peruviensis*, Megerle v. Mühlfeldt [in Anton's Verz. der Conch. p. 48

(1837)],=*P. spiculata*, according to the typical specimen of Anton, now in the Dresden Museum. It has been renamed *P. antonii* by Küster [Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, Limnæaceen, p. 12 (1850)], but his figures (t. 2. figg. 6–8) much more nearly resemble *P. sowerbyana*, d'Orb.; it is therefore probable that Megerle and Anton have united different forms under the one name *peruviensis*, which, moreover, is preceded by *P. peruviana*, Gray (Spicilegia Zoologica, 1828).

Var. *tapanensis*.

Aplecta tapanensis, Fisch. & Crosse, loc. cit. p. 93, t. 30. figg. 6 *a*, *b* [6].

Physa speculosa, Clessin, in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, Limnæiden, p. 349, t. 49. fig. 9 [7].

Spire shorter, shell very thin, aperture more lengthened below, columellar margin more twisted.
Long. 16, diam. 7; apert. long. 9, lat. 3 millim.
„ 18, „ 8; „ $10\frac{1}{2}$, „ $4\frac{1}{2}$ „

Hab. S.W. Mexico: Tapana, on the Isthmus of Tehuantepec, west of Tonala (*Sumichrast* [6]).

S.E. Mexico: Frontera, State of Tabasco (*H. H. Smith*: young specimens).

Yucatan: Campeche (*Morelet*); Tabi (*Godman*).

Some of the specimens collected by Morelet agree exactly with this variety. Clessin's description and figure [7] were drawn from an example in the Albers collection, which is now before me; the name "*speculosa*" being evidently a mistake for "*spiculata*."

Var. *guatemalensis*.

Aplecta tapanensis, var. *guatemalensis*, Fisch. & Crosse, loc. cit. p. 94 [8].

Similar to the preceding, but considerably smaller.
Long. 13, diam. 7; apert. long. 9, lat. 3 millim.

Hab. Central Guatemala: Plateau of Guatemala, in small streams (*Bocourt* [8]).

W. Guatemala: Antigua, in wells in the city (*Stoll*); Lake of Dueñas (*Salvin*).

Central Costa Rica: San Francisco de los Rios, near San José (*Pittier*); San José (*Biolley*).

I am unable to point out any reliable characters by which the vars. *tapanensis* and *guatemalensis* may be separated from *P. sowerbyana*, d'Orb. (*rivalis*, Maton), a species common in the Antillean islands and on the continent of South America.

Var. *nitidula*.

Physa nitidula, Clessin, loc. cit. p. 339, t. 47. fig. 9 (1886) [9].

Hab. Honduras (*coll. Morelet* [9]).

Clessin [9] describes the columellar margin as twisted, but according to his figure it is not essentially different from that of the typical form of *P. spiculata*.

12. **Physa bullula.**

Aplecta bullula, Crosse & Fisch. in Journ. de Conch. xxix. p. 334 (1881) [1]; Miss. Scient. Mex., Mollusca, ii. p. 91, t. 39. figg. 6, 6 *a*, *b* [2].

Hab. E. Mexico: Toxpam, State of Vera Cruz (*Sallé* [1 2]).

Very nearly allied to *P. sowerbyana*, d'Orb., from Cuba, Jamaica, Puerto Rico, and St. Thomas, and to *P. rivalis*, Maton (1807), from the mainland of South America. Not having Mexican specimens at hand, I am unable to point out any reliable differences.

13. **Physa obtusa.** (Tab. XX. figg. 7, 7 *a*.)

Physa obtusa, Clessin, in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, Limnæiden, p. 292, t. 42. fig. 3 [1].

Ovate, yellow, rather solid, with very short spire and rather thick twisted columellar margin; suture white; a few white scratches near the base of the last whorl.

Long. 13–14, diam. 7–8; apert. long. 10½, lat. 5 millim.

Hab. Honduras (*Hjalmarson* [1]).

Through the kindness of S. Clessin, I have been enabled to examine the original specimens of this species; it comes near *P. bullula* and *P. spiculata*, but differs from both in the remarkably shorter spire, the stronger, distinctly twisted columellar margin, the more intense yellow colour, and the solidity of the shell.

Subgen. Alampetis, n.

Shell not so glossy and shining as in *P. fontinalis*, and more solid, with convex whorls; apex sometimes eroded; margin of the aperture often thickened internally. Indented edges of the mantle and teeth of the radula as in typical *Physa*. Eggs deposited in kidney-shaped masses, sometimes on shells of the same species.

The Mexican and some North-American species of *Physa* differ from the typical forms of this genus in the dull surface of the shell, contrasting strikingly with the glossy appearance of *P. fontinalis*. As the indented mantle-edges and the pectinated teeth of the radula have been found by myself to be present in *P. berendti* and *P. mexicana*, and the last-mentioned character in *P. squalida* by Fischer, these species cannot be referred to *Isidora*, in which genus the surface of the shell is also dull (not shining), the radula is quite differently formed, and the mantle is without indentations. The kidney-shaped form of the egg-masses has been noticed in *P. heterostropha* by Haldeman (Monogr. Limniad. no. vi. t. 1. fig. *a*), in *P. strebeli* by Strebel (Beitr. Mex. Land- und Süssw.-Conch. i. t. 6. fig. 27), and in *P. berendti* by myself; whereas in *P. fontinalis* (*cf.* C. Pfeiffer, Land- und Süssw.-Moll. Deutschlands, i. t. 8. figg. 1–3) the egg-masses are flat and oval in form; in *P.* (*Aplecta*) *hypnorum*, L., however, they are also kidney-shaped (*cf.* C. Pfeiffer, l. c. t. 7. figg. 24–27).

To this subgenus also the North-American *Physa ancillaria*, Say, may be referred.

Comparative Table of the Species of *Physa*, Subgen. *Alampetis*.

Nomen.	Forma.	Sculptura.	Coloratio.	Aperturæ		Apert. long. in long. testæ.	Long.	Diam.	Apert.	Patria.
				Margo externus.	Margo columellaris.					
osculans, *Haldem.*.....	oblongo-ovata.	striatula.	griseo-flavida.	valde arcuatus, roseo-labiatus.	paulum tortus, recedens.	$\frac{2}{3}$–$\frac{5}{8}$	mm. 17–21	mm. 10–12	mm. 11½–14	Centr. Mexico.
——, var. mexicana, *Philippi.*	latius ovata.	,,	,,	,,	,,	$\frac{5}{7}$–$\frac{3}{4}$	15–21	10–12½	12–15½	Texas, Centr. & E. Mexico.
—— ——, subvar. plicata, *F. & Cr.*	,,	verticaliter plicata.	,,	,,	,,	$\frac{3}{4}$	17	10	13	Centr. Mexico.
—— ——, subvar. tolucensis, *F. & Cr.*	,,	striatula.	,,	,,	,,	$\frac{5}{7}$	25	15	19	Centr. Mexico.
——, var. coniformis, *Streb.*	infra suturam tumida, dein attenuata.	,,	pallide griseo-flavida.	valde arcuatus, simplex.	subverticalis.	$\frac{3}{4}$	18	11	14	Centr. Mexico.
——, var. boucardi, *Cr. & F.*	angustius ovata.	levius striatula.	fusco-cornea.	minus arcuatus, simplex.	paulum tortus, recedens.	$\frac{2}{3}$	11–21	6–13	7½–15	Centr. Mexico.
berendti, *Dkr.*	ovata vel latiuscule ovata.	striatula.	corneo-flavescens, sæpe nigro-induta.	varice flavo munitus.	crassus, subverticalis.	$\frac{2}{3}$	9½–14	5–8	7–8	N.W., S.W., E., & S.E. Mexico.
——, var. minima, *v. Mart.*	ovata.	,,	pallide cornea.	,,	,,	$\frac{5}{7}$	6½–7	3½–4	4–4¾	N.W. & E. Mexico.
——, var. lacustris, *Cless.*	late ovata, spira brevi, mucronata.	leviter striata.	,,	simplex.	,,	$\frac{5}{7}$	8	5	6	E. Mexico.
——, var. intermedia, *F. & Cr.*	ovata.	striatula.	flavescens, substrigosa,	rufo-labiatus.	,,	$\frac{2}{3}$	13½	8	9	S. Centr. Mexico.
squalida, *Morel.*	,,	confertissime striatula, passim decussatula.	pallide cornea, apice nigricante.	simplex.	,,	$\frac{5}{8}$–$\frac{2}{3}$	10–11	6–8	7½–9	S.E. Mexico, Centr. & E. Nicaragua.
strebeli, *Cr. & F.*	globoso-ovata, sutura profunda.	subtiliter striata.	pallide cornea, apice fusco.	albo-labiatus.	,,	$\frac{5}{8}$	16½–18½	9½–11½	10¾–12	E. Mexico.
polakowskyi, *Cless.* ...	acute ovata.	levissime striatula.	pallide flavescens.	leviter albo-marginatus.	subverticalis, albus, callo lato.	$\frac{5}{8}$–$\frac{2}{3}$	6½–9	4–5	5–6	Centr. Guatemala, Centr. Costa Rica.
tehuantepecensis, *Cr. & F.*	biconico-ovata.	minute striata.	pallide castanea vel corneo-flavescens.	minime arcuatus.	subverticalis, non contortus.	$\frac{5}{7}$	12	7	9	S.W. Mexico.
?? hjalmarsoni, *Cless.* .	oblongo-ovata.	rudiuscule verticaliter striata.	griseo-fusca, striis nonnullis albidis.	paulum arcuatus, simplex.	superne validus, tortus, infra abbreviatus.	$\frac{2}{3}$	17–19	8½	12	Honduras.

14. Physa osculans.

Physa osculans (part.), Haldeman, Monogr. Limniades, no. vi. p. 29, t. 2. fig. 11 (1842)[1]; Küster, in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, Limnæaceen, p. 23, t. 4. figg. 1–3[2]; Pilsbry, Proc. Acad. Phil. 1891, p. 323[3].

Physa mexicana (part.), v. Mart. Malak. Blätt. xii. p. 56 (1865)[4]; Strebel, Beitr. Mex. Land- und Süssw.-Conch. i. p. 50, t. 6. figg. 26, 26 *c* (1873)[5].

Physa mexicana, var. *conoidea*, Fisch. & Crosse, Miss. Scient. Mex., Mollusca, ii. p. 100, t. 39. fig. 8[6].

Ovate-oblong, with rather long pointed spire; greyish-yellow, moderately shining; aperture widening considerably downwards; columellar margin thick, but attenuated and twisted backwards towards the lower part.

a. Long. 21, diam. 12; apert. long. 14, lat. 7 millim.
b. „ 20, „ 11; „ 14, „ 7 „
c. „ 17, „ 10; „ $11\frac{1}{2}$, „ 6 „

a. Haldeman's figure[1]; *b*. Specimen from the city of Mexico[4]; *c*. Fischer and Crosse's figure[6].

Hab. Central Mexico: city of Mexico, in ditches (*Deppe & Schiede*[4]); Lake Texcoco, near the city of Mexico (*Méhédin*[6], *Heilprin*[3]); San Angel and Yautepec (*Heilprin*[3]); Mexico, without nearer indication of locality, in company with *Planorbis tenuis* and *Limnæa subulata* (*Uhde*[4]); Mexico, also without nearer indication of locality (*Dr. Burrough*[1 2]); Puebla (*Boucard*[6]).

Küster[2] gives as locality "Mexico and Indiana in North America": this is a misunderstanding of Haldeman's statement[1] that Dr. Burrough has also made collections in Indiana.

Var. *mexicana*. (Tab. XX. fig. 13.)

Physa osculans (part.), Haldeman, loc. cit. fig. 12[7].

Physa mexicana (Philippi), Küster, in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, Limnæaceen, p. 5, t. 1. figg. 3, 4 (1845–48)[8]; v. Mart. Malak. Blätt. xii. p. 57 (1865) (part.)[9]; Binney, Land and Freshw. Shells N. Am. ii. p. 83, fig. 143[10] (copied from Küster); Strebel, loc. cit. p. 50, t. 6. figg. 26 *d*, *f*[11]; Fisch. & Crosse, loc. cit. p. 100, t. 30. figg. 12, 12 *a*, *b*[12].

More inflated than the type of *P. osculans*, with shorter spire, but passing gradually into the former.

a. Long. 21, diam. $12\frac{1}{2}$; apert. long. $15\frac{1}{2}$, lat. 8 millim.
b. „ 19, „ 12; „ 15, „ 8 „
c. „ $17\frac{3}{4}$, „ $11\frac{1}{4}$; „ $14\frac{1}{4}$, „ $6\frac{1}{2}$ „
d. „ 15, „ 10; „ 12, „ $5\frac{1}{2}$ „
e. „ 15, „ 10; „ $12\frac{1}{2}$, „ 6 „

a. Philippi's type, according to Küster's figure[8]; *b*. Haldeman's fig. 12; *c*. Specimen from the city of Mexico, collected by Deppe, Strebel's fig. 26 *f*; *d*. Fischer and Crosse[12]; *e*. Another specimen from the city of Mexico, collected by Strebel, in Berlin Museum.

Hab. North America: Texas[10].

Central Mexico: city of Mexico, in ditches (*Deppe & Schiede*[9], *Strebel*[11]); Mexico, without nearer indication of locality (*Dr. Burrough*[7], *Philippi*[8 10]); Lake of Chalco, S.E. end of the plain of Mexico (*Méhédin*[12]); Puebla (*Godman*).

E. Mexico: Jalacingo, State of Vera Cruz (*Höge*).

Subvar. *plicata*.

Physa mexicana, var. *plicata*, Fisch. & Crosse, loc. cit. p. 100, t. 30. figg. 11, 11 *a*, *b* [13] (not *P. plicata*, De Kay, 1843).

Only differing from the type of *P. osculans*, var. *mexicana*, in the longitudinal plaits.
Long. 17, diam. 10; apert. long. 13, lat. 6 millim.

Hab. CENTRAL MEXICO: near the city of Mexico (*Méhédin* [13]).

The plaits are not indicated in the quoted figure [13], the sculpture not being shown in this and the other figures of *Physa* and *Aplecta* in Fischer and Crosse's work: in the explanation of the figures, fig. 11 is named simply *P. mexicana*, and fig. 12 var. *plicata*, but the quotation in the text (p. 100) and the comparative natural size of both prove that the names have been reversed.

Subvar. *tolucensis*.

Physa mexicana, var. *tolucensis*, Fisch. & Crosse, loc. cit. p. 100, t. 30. figg. 13, 13 *a* [14].

Only differing from the type of *P. osculans*, var. *mexicana*, in its larger size.
Long. 25, diam. 15; apert. long. 19, lat. 9 millim.

Hab. CENTRAL MEXICO: Toluca (*Boucard* [14]).

Var. *coniformis*. (Tab. XX. fig. 17.)

Physa ventricosa, Uhde, MS. in Mus. Berol. [15].
Physa osculans (Haldem.), v. Mart. Malak. Blätt. xii. p. 58 (1865) [16].
Physa mexicana, var. *coniformis*, Strebel, Beitr. Mex. Land- und Süssw.-Conch. i. p. 52, t. 6. fig. 26 *g* [17].
Physa osculans, var. *patzcuarensis*, Pilsbry, Proc. Acad. Phil. 1891, p. 323, t. 15. fig. 5 [18].

Last whorl swollen above, and from thence gradually narrowing downwards. Shell rather thin, some specimens with malleated impressions.
Long. 18, diam. 11; apert. long. 14, lat. 7 millim.

Hab. CENTRAL MEXICO: Patzcuaro, State of Michoacan (*Uhde* [15 16 17], *Heilprin* [18]).

This form has somewhat the appearance of a young shell, but it seems to be confined to one lake, and young specimens of var. *mexicana* have a quite different shape.

Var. *boucardi*. (Tab. XX. fig. 18.)

Physa mexicana (part.), Strebel, loc. cit. p. 51, t. 6. figg. 26 *a*, *e* [19].
Physa boucardi, Crosse & Fisch. Journ. de Conch. xxix. p. 334 (1881) [20]; Miss. Scient. Mex., Mollusca, ii. p. 102, t. 30. figg. 4, 4 *a* [21].

More elongate, aperture distinctly narrower, elliptical, its external margin less arcuate than in the true *P. osculans*.

a. Long. 21, diam. 13; apert. long. 15, lat. 7 millim.
b. „ $16\frac{3}{4}$, „ 9; „ 11, „ $5\frac{1}{2}$ „
c. „ 11, „ 6; „ $7\frac{1}{2}$, „ $3\frac{1}{2}$ „
a. Crosse and Fischer's statement [20 21]; *b*, *c*. Strebel [19].

Hab. CENTRAL MEXICO: Lake of Mexico (*Boucard* [20 21]); city of Mexico (*Strebel* [19]).

15. Physa berendti.

Physa mexicana, var. *minor* and var. *parva*, v. Mart. Malak. Blätt. xii. p. 57 (1865) [1].

Physa heterostropha (Say ?), Strebel, Beitr. Mex. Land- und Süssw.-Conch. i. p. 54, t. 7. figg. 28, 28 *a*, 29 *a–i* [2].

Physa berendti, Dunker (MS.), in Mus. Berol. [3]; Fisch. & Crosse, Miss. Scient. Mex., Mollusca, ii. p. 104, t. 27. figg. 14, 14 *a*, *b* [4].

Physa squalida (Morelet), Pilsbry, Proc. Acad. Phil. 1891, p. 324 [5].

Ovate, rather solid, often marked with a yellowish-white thickening just behind the aperture; columellar margin comparatively thick, ordinarily straight, but in some specimens also distinctly twisted. Whorls $4\frac{1}{2}$.

Long. $9\frac{1}{2}$–14, diam. 5–8; apert. long. 7–8, lat. 3–$3\frac{1}{2}$ millim.

Hab. N.W. Mexico: Guadalajara, Tepic, and Ameca, all in the State of Jalisco (*Richardson*).

E. Mexico: Misantla (*Strebel* [2]); Rio Colipa, near the town of Colipa, in the "tierra caliente" (*Deppe & Schiede* [1]); Rio de Octopan, also in the "tierra caliente" (*Deppe* [1]); Jalapa (*Deppe* [1], *Höge*); Almolonga (*Höge*); Vera Cruz (*Uhde* [1]), on overflowed meadows and in the Laguna de los Cocos (*Strebel* [2]); Orizaba (*Heilprin* [4], *H. H. Smith*).

S.W. Mexico: Isthmus of Tehuantepec (*Sumichrast* [3]).

S.E. Mexico: Tabasco (*Morelet* [3]).

Very variable in form, as shown by the numerous figures given by Strebel [2]. Although this species may easily be distinguished at first sight from *P. osculans*, var. *mexicana*, by the thickness and straightness of the columellar margin, it will be found, upon closer examination, that many intermediate forms occur. Irregular spiral ridges were observed by Strebel in some specimens, resembling those which are often found in the European *Limnæa palustris*.

Var. *minima*. (Tab. XX. fig. 16.)

Physa ovalis, Wiegmann (MS.), in Mus. Berol. [6].

Physa mexicana, var. *minima*, v. Mart. Malak. Blätt. xii. p. 58 (1865) [7]; Strebel, loc. cit. p. 52, t. 7. fig. 26 *k* [8].

Similar in form to the type, but always smaller. Whorls 4–$4\frac{1}{2}$.

Long. $6\frac{1}{2}$–7, diam. $3\frac{1}{2}$–4; apert. long. 4–$4\frac{3}{4}$, lat. nearly 2 millim.

Hab. N.W. Mexico: Tepic (*Richardson*).

E. Mexico: Jalapa (*Deppe* [6 7 8]); Orizaba (*H. H. Smith*).

A distinct thickening at the margin of the aperture seems to indicate that these small specimens are full-grown. Mr. Richardson collected a large number of individuals, all of nearly equal size.

Var. *lacustris.*

Physa lacustris, Clessin, in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, Limnæiden, p. 344, t. 48. fig. 9[9].

Very small, with short obtuse spire.

Hab. E. Mexico: Lake Coatepec[9].

Var. *intermedia.*

Physa berendti, var. *intermedia,* Fisch. & Crosse, loc. cit. p. 104, t. 39. figg. 7, 7 *a*, *b*[10].

With more prolonged spire and less thickened columellar margin; a reddish thickening behind the margin of the aperture.

Hab. S. Central Mexico: Putla, State of Oaxaca (*Sallé*[10]).

This form seems to me to be nearer to *P. osculans* than to *P. berendti.*

16. **Physa squalida.**

Physa squalida, Morelet, Test. Noviss. ii. p. 16 (1851)[1]; Tate, in Am. Journ. Conch. v. p. 158 (1870)[2]; Fisch. & Crosse, Miss. Scient. Mex., Mollusca, ii. p. 105, t. 30. figg. 14, 14 *a*[3]; Clessin, in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, Limnæiden, p. 334, t. 47. fig. 1[4].

Hab. S.E. Mexico: in swamps of the river Usumacinta, near Balancan, State of Tabasco (*Morelet*[1 3]).

Central Nicaragua: pools bordering the Lake of Nicaragua, at Grenada (*Tate*[2]).

E. Nicaragua: in a creek of the Rio San Juan, Toro Rapids (*Tate*[2]).

Fischer and Crosse distinguish this species from *P. berendti* by the elongate spire and the absence of a thickening in the margin of the aperture; they quote for it also Strebel's fig. 28, taken from a specimen from Vera Cruz. But as this latter shows a distinct thickening in the margin, it is safer to leave it with *P. berendti*, as Strebel has done, and limit *P. squalida* to the more southern regions. I have not seen a specimen from Tabasco.

Fischer and Crosse[3] also mention Costa Rica, without nearer indication, as a locality for *P. squalida*, on the authority of Sallé; this Costa Rican shell probably belonged to *P. polakowskyi.*

17. **Physa strebeli.**

Physa osculans, var. *minor,* v. Mart. Malak. Blätt. xii. p. 58 (1865)[1].

Physa, sp., Strebel, Beitr. Mex. Land- und Süssw.-Conch. i. p. 53, t. 6. figg. 27, 27 *a*, *b* (1873)[2].

Physa strebeli, Crosse & Fisch. Journ. de Conch. xxix. p. 335 (1881)[3]; Miss. Scient. Mex., Mollusca, ii. p. 103[4].

A more solid shell than *P. osculans,* with deep sutures and a thickened lip at the aperture.

Hab. E. Mexico: Vera Cruz (*Uhde, in Mus. Berol.*[1]); in a ditch outside the wall of the town of Vera Cruz (*Strebel*[2–4]).

The living animal examined and figured by Strebel (*loc. cit.* p. 54) shows an indented margin of the mantle.

P. strebeli comes very near *P. cubensis*, Pfr., from Cuba, which is, however, somewhat more shining, with a thinner and slightly arcuated columellar margin.

18. **Physa polakowskyi.** (Tab. XX. figg. 14, 15.)

Physa polakowskii, Clessin, in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, Limnæiden, p. 352, t. 49. fig. 12 (1886) [1]; Biolley, Moluscos terr. y fluv. de Costa Rica, p. 18 [2].

A small shell, pale yellow in colour, with rather convex whorls, deep suture, and a very thick, white, nearly straight columellar margin; a broad whitish callus on the inner wall of the aperture; a thin white deposit inside the outer margin.

Long. $6\frac{1}{2}$–9, diam. 4–5; apert. long. 5–6, lat. $2\frac{3}{4}$–3 millim.

Hab. Central Guatemala: near the capital (*H. Polakowsky*, *in Mus. Berol.*, 1877 [1]).

Central Costa Rica: San José, in the rivers Tiribi and Virilla, also in an irrigation-tube (*Biolley* [2]).

19. **Physa tehuantepecensis.**

Physa tehuantepecensis, Crosse & Fisch. Journ. de Conch. xxix. p. 335 (1881) [1]; Miss. Scient. Mex., Mollusca, ii. p. 106, t. 27. figg. 15 *a*, *b* [2].

Somewhat biconical, the spire projecting as in typical *P. osculans*, and the lower half of the last whorl narrowed considerably downwards; outer margin of the aperture very little arcuated; columellar margin broad, nearly straight.

Hab. S.W. Mexico: Isthmus of Tehuantepec (*Sumichrast* [1 2]).

[20. **Physa hjalmarsoni.**

Physa hjalmarsoni, Clessin, in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, Limnæiden, p. 295, t. 42. fig. 6 (1885) [1].

Oblong-ovate, dull brown, with rather coarse whitish vertical striæ; suture rather deep; columellar margin broad above, strongly twisted, white, below thin and arcuated towards the basal margin.

Length of a specimen much worn at the apex 17, diam. $8\frac{1}{2}$; apert. long. 12, lat. 6 millim.

Hab. ? Honduras (*Hjalmarson* [1]).

Having examined the typical specimens, I cannot help thinking that this may be one of the numerous forms of *P. proteus*, Sow., and therefore of Australian, not American, origin.]

Obs.—It may be here noted that *Physa subarata*, Menke [Synopsis Molluscorum, p. 132 (1830)], from Cincinnati, according to a specimen given by the author in 1831 to my father, and now in the Berlin Museum, belongs, without doubt, to *P. ancillaria*, Say, as figured by Haldeman (Monogr. Limn. t. 3. fig. 1), and not to *P. heterostropha*, as was supposed by Haldeman and Binney.

LIMNÆA.

Buccinum, Geoffroy, Traité somm. de coquilles de Paris, p. 70 (1767); O. Fr. Müller, Hist. Verm. ii. p. 126 (nec Linn.).
Lymnæa, Lamarck, Syst. d'Anim. sans Vert. p. 91 (1801).
Limneus, Draparnaud, Tabl. Moll. Terr. et Fluv. de France, p. 47 (1801).
Limnæa, Desmarest (1814), etc.; Fischer & Crosse, Miss. Scient. Mex., Mollusca, ii. p. 38.

Shell dextrally spiral, longer than broad, with acute, more or less prominent, spire; aperture oval, with spirally twisted columellar margin. Feelers broad, triangular. Radula with very small median tooth and bi- or tricuspidate laterals.

Cosmopolitan, more numerous in the temperate than in the tropical zone.

1. Limnæa attenuata.

Limnæa attenuata, Say, in New Harmony Disseminator of useful knowledge, ii. p. 244 (1829)[1]; ed. Binney, p. 48[2]; Hald. Monogr. Limniades, iv. p. 28, t. 9. figg. 1–5[3]; Küster, in Martini & Chemnitz, Syst. Conch.-Cab., ed. 2, *Limnæus*, p. 39, t. 7. fig. 8[4]; Binney, Land and Freshwater Shells N. Am. ii. p. 42, figg. 53–55[5]; Sowerby, in Reeve's Conch. Icon. xviii., *Limnæa*, t. 13. fig. 32 *c*[6]; Strebel, Beitr. Mex. Land- und Süssw.-Conch. i. p. 57, t. 5. figg. 32, 32 *a*[7]; Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. t. 27. figg. 11, 11 *a*, *b*, ii. p. 49[8]; Pilsbry, Proc. Acad. Phil. 1891, p. 320[9].
Omphiscola pugio, Beck, Index Moll. p. 110 (1837) (sine descr.)[10].
Limnæus subulatus, Dunker, in Küster, Martini & Chemnitz, Syst. Conch.-Cab., ed. 2, *Limnæus*, p. 24, t. 4. fig. 24 (1862)[11]; v. Mart. in Malak. Blätt. xii. p. 58 (1865)[12]; Clessin, in Martini & Chemnitz, Syst. Conch.-Cab., ed. 2, Limnæiden, p. 395, t. 16. fig. 1[13].
Limnæa emarginata (Hald.), Sowerby, in Reeve's Conch. Icon. xviii., *Limnæa*, t. 6. fig. 35[14].
Limnæus turritus, Philippi, in coll. Dunker[15].
Limnæus mexicanus, Ziegler, in coll. Dunker[16].

Hab. Central Mexico: in ditches and ponds in the vicinity of the city of Mexico (*Say*[1 2 4]; *Deppe & Schiede*[12]); Mexico city, in plenty, in company with *Physa mexicana* and *Planorbis tenuis* (*Uhde*[12]); Lake of Mexico (*Dunker*[11]); Lake of Chalco (*Strebel*[7], *Heilprin*[9]); Zimapan in Hidalgo (*David, in coll. Dunker*[11]).

The locality "Massach." (*Massachusetts*) given by Sowerby[6], and by Pätel in his Catalogue (1889), is of course incorrect.

In its very elongate slender shell this species closely resembles some forms of the European *L. palustris* and of its North-American congener *L. reflexa*, Say; but it may be distinguished from both of them by the relatively narrower and less convex upper whorls, the penultimate one included, which contrasts generally by its slenderness with the more convex and sometimes inflated last whorl. The general colour, also, of the Mexican shell inclines to yellowish-brown, whereas in the European and North-American

Comparative Table of the Species of *Limnæa*.

Nomen.	Figura.	Perforatio.	Sculptura et Coloratio.	Apertura.	Anfractus.	Long.	Diam.	Apert. long.	Patria.
attenuata, *Say*	elongata, gracilis.	nulla.	striatula, fusco-cornea.	$\frac{1}{2}$–$\frac{3}{5}$, anguste ovata, marg. colum. spiratim intrante.	6–8, planulati.	mm. 17–33	mm. 6–11	mm. 9–12	Centr. Mexico.
palmeri, *Dall*	obesa, sutura profunda.	subclausa.	inciso-striata, rufescens.	rotundato-ovata, minus $\frac{1}{3}$, marg. col. tenui.	4, inflati.	25	14	?	N.W. Mexico.
cubensis, *Pfr*.....	ovato-conica.	distincta.	minutissime decussata, cinereo-fulvescens.	$\frac{1}{2}$ vel paulo longior, late ovata, marg. colum. arcuato, reflexo.	5–6, convexiusculi.	10	7	$6\frac{1}{2}$	E. Mexico, W. Guatemala, &c.
columella, *Say*	ovata.	,,	striatula, fusco-cornea.	$\frac{2}{3}$, piriformi - ovata, marg. colum. tenui, subarcuato.	convexi.	20	11	14	[N. America.]
——, var. championi, *v. Mart.*	oblongo-ovata.	rimata.	striatula, pallide fulva.	$\frac{2}{3}$, anguste ovata.	4, superiores perconvexi.	12–$13\frac{1}{2}$	6–8	8–9	S. Panama.
sordida, *Küst.*	ovato-oblonga.	perforato-rimata.	reticulata, fusca.	anguste ovata, marg. colum. stricto.	convexi, 6.	$23\frac{1}{2}$	$11\frac{1}{2}$	13	Centr. America?
macrostoma, *Say*	ovata.	nulla.	striatula, pallide cornea.	$\frac{5}{7}$, late ovata, marg. colum. tenui, stricto.	5, ult. valde convexus.	20	12	15	Mexico?

forms it is somewhat castaneous; moreover, in these last-mentioned species there is often a distinct dark red band inside the aperture in full-grown specimens, of which there is no trace in *L. attenuata*. The surface of the shell of *L. attenuata* is also smoother and somewhat shining, not so distinctly striate as in that of *L. palustris* and *L. reflexa*. In full-grown specimens of the Mexican species the aperture is somewhat broadly rounded, the external margin being fully arcuated, and in some examples even angularly bent. The columellar fold is generally very distinctly twisted, and the columellar margin has a free edge below, not appressed to the surface of the last whorl, thus exhibiting a more open umbilical cleft than usual in the European *L. palustris*.

To show the individual variation in the form of the shell, I give here a series of measurements taken from specimens in the Berlin Museum: it will be seen that the breadth of the last whorl varies from $\frac{1}{4}$ to $\frac{3}{7}$, and the length of the aperture from $\frac{1}{2}$ to somewhat less than $\frac{3}{8}$, of the whole length, and also that the length of the aperture is usually greater than the breadth of the last whorl, rarely equal or even a little less (*d*).

	Length of the whole shell.	Breadth of the last whorl.	Breadth of the penultimate whorl.	Length of the aperture.	Number of whorls.
	millim.	millim.	millim.	millim.	
a	33	11	6	12	$8\frac{1}{2}$
b	$32\frac{1}{2}$	8	5	$11\frac{1}{2}$	7
c	23	$9\frac{1}{2}$	$5\frac{1}{2}$	10	$7\frac{1}{3}$
d	22	$9\frac{1}{2}$	5	9	7
e	22	$8\frac{1}{2}$	5	$9\frac{1}{2}$	7
f	22	$7\frac{1}{2}$	5	9	7
g	21	9	5	9	7
h	20	$5\frac{1}{2}$	4	8	7
i	18	8	$4\frac{1}{2}$	9	$6\frac{1}{2}$
k	18	7	4	8	$7\frac{1}{2}$
l	17	6	$4\frac{1}{2}$	9	$6\frac{1}{2}$

The specimen *l* is decidedly, and *i* probably, not full-grown; but *k*, though remarkably small, is apparently full-grown, showing a somewhat thickened external margin and a very conspicuous callus on the columellar wall.

2. Limnæa palmeri. = Recluzia palmeri -

Limnæa palmeri, Dall, Am. Journ. of Conch. vii. p. 135 (1871)[1]; Fisch. & Crosse, Miss. Scient. Mex., Mollusca, ii. p. 51[2].

Hab. N.W. Mexico: River Yaqui, at mouth, south of Guaymas, State of Sonora (*Edw. Palmer*[1 2]).

Allied to *L. megasoma*, Say. According to Dall[1], the incised lines, very round whorls, and deeply channelled suture are its distinguishing characters.

3. Limnæa cubensis.

Limnæus cubensis, Pfr. in Wiegmann's Archiv f. Naturg. 1839, p. 354[1]; Küster, in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, *Limnæus*, p. 32, t. 6. figg. 6–8[2]; Tryon, in Am. Journ. of Conch. ii. p. 11 (1866) (*Lymnæa*)[3]; Sowerby, in Reeve's Conch. Icon. xviii., *Limnæa*, t. 8. fig. 48[4]; Strebel, Beitr. Mex. Land- und Süssw.-Conch. i. p. 58, t. 4. fig. 33[5]; Fisch. & Crosse, Miss. Scient. Mex., Mollusca, i. t. 27. figg. 32, 32*a*, ii. p. 50[6]; Pilsbry, Proc. Acad. Phil. 1891, p. 320[7].

Hab. E. Mexico: City of Vera Cruz, in ditches near the railway (*Strebel*[5]); Rio Tenoya, Vera Cruz (*Strebel*[3]); Orizaba (*Heilprin*[7]).
W. Guatemala: Antigua, in rivulets (*Morelet*[6]).
Central America (*Küster*).
Antilles: Cuba (*Pfeiffer*[1 2 4]); Puerto Rico (*Blauner*); Santa Cruz (*Griffith*[3]).
Venezuela: Caracas (*Gollmer, in Mus. Berol.*).

A small conico-globose species, allied to the European *L. truncatula*, Müll.

Pilsbry[7] identifies *L. cubensis* with the North-American *L. umbilicata*, C. B. Adams (1840), which is said to extend from New England to St. Louis and Eastern Texas, and includes with it as a variety *L. bulimoides*, Lea, which inhabits the west coast from Vancouver to California, and also occurs in Central Nebraska and Western Texas. This establishes a continuity in the range of *L. umbilicata*, analogous to the wide distribution of the nearly allied *L. truncatula*, Müll., within Europe—from Northern Norway (71° N. lat.) and Lulea, Lapland, to Spain, Italy, and Greece,—and the occurrence of the latter in Siberia, Syria, Northern Africa, and Madeira.

4. Limnæa columella.

Limnæa columella, Say, Journ. Acad. Phil. i. p. 14 (1817), ii. p. 107 (1821)[1]; ed. Binney, pp. 56, 60[2]; Haldem. Monogr. Limniades, v. p. 38, t. 12[3]; A. Gould, Invertebr. Mass. pp. 215, 216, figg. 144, 145[4]; ed. 2, p. 471, fig. 723[5]; Küster, in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, *Limnæus*, p. 44, t. 8. figg. 3–5[6]; Binney, Land and Freshw. Shells N. Am. ii. pp. 32–37, figg. 38–44[7]; Reeve, Conch. Icon. xviii., *Limnæa*, t. 10. fig. 36*b*[8].

Hab. North America: from Lake Superior, Canada, and Nova Scotia to Georgia and Missouri[5 7].

Binney[7] (p. 37) also gives as locality, "San Felipe Spr." (*Capt. Beale*), which is probably the San Felipe in New Mexico or the place of that name in Texas.

Var. *championi*, n. (Tab. XIX. fig. 12.)

Shell oblong-ovate, thin, irregularly striate, fawn-coloured; whorls 4, moderately increasing, the upper ones very convex, the last oblong, less convex. Aperture very slightly oblique, occupying $\frac{2}{3}$ of the whole length, narrowly oval, not very acute above; its outer margin not much arcuated; basal margin rounded; columellar margin almost vertically ascending, thin, triangularly reflexed above, having a small umbilical slit in some specimens.

Long. 12–13$\frac{1}{2}$, diam. 6–8; apert. long. 8–9, lat. 4–5 millim.

Hab. S. Panama: Bugaba (*Champion*).

This variety is very like a *Succinea*, but it may be distinguished at once from the species of that genus by the subhorizontal course of the suture. I have examined the radula, to ascertain its true affinities.

Doubtful Species of Limnæa.

Limnæa sordida.

Limnæus sordidus, Küster, in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, *Limnæus*, p. 58, t. 12. figg. 15, 16 (1862) [1].

Of the general form of the European *L. peregra*, Müll., blackish, fenestrated by conspicuous, irregular, elevated lines, vertical and spiral. Length $23\frac{1}{2}$, breadth $11\frac{1}{2}$, aperture 13 millim.

Hab. Central America (*coll. Von dem Busch* [1]).

I cannot help thinking that *L. sordida* belongs to the North-American form figured by Haldeman (Monogr. Limniades, no. 4, t. 6. fig. 1) as *L. fragilis* (L.), and by Binney (Land and Freshw. Shells N. Am. ii. p. 47, fig. 65) as *L. palustris* (Müll.); it is, however, quite distinct from the European *L. palustris*, and may be named more properly *L. elodes*, Say. A similar fenestration sometimes occurs in the true *L. palustris*. There is a shell very like it in Paetel's collection with the apocryphal name *L. nigra*, and the still more improbable locality "Cap." Another allied form, not fenestrated, corresponding to Haldeman's tab. 7. fig. 5 (*umbrosa*), is contained in Dunker's collection, now in the Berlin Museum, also with the locality "Central America."

Limnæa macrostoma.

Limnæa macrostoma (Say), Tryon, in Am. Journ. of Conch. ii. p. 11 (1866) [1]; Fisch. & Crosse, Miss. Scient. Mex., Mollusca, ii. p. 52 [2].

This well-known N.-American form, which ranges southward to Georgia (see Binney, Land and Freshw. Shells N. Am. ii. pp. 33–37), is admitted by Tryon [1] and Fischer and Crosse [2] among the Mexican species on the authority of Dr. Berendt. But as H. Strebel, who was very intimate with Dr. Berendt in Mexico and knew his material well, does not mention it in his work on the Mexican Land and Freshwater Shells, I hesitate very much to include it in the Mexican list. It is not impossible that a *Succinea* has been mistaken for a *Limnæa* of this sort.

For *Limnæa rugosa*, Val., see *Otostomus dombeyanus*, anteà, p. 199.

PLANORBIS.

Planorbis (Guettard, 1754), Geoffroy, 1767; O. Fr. Müller, Draparnaud, Lamarck, &c.

Shell discoidal, each succeeding whorl in one and the same plane with those preceding, the shell thus appearing more or less hollowed in the centre (umbilicated) on both sides, but in most of the species not to the same amount. Plane of the aperture more or less oblique to the axis of the whorls.

A pair of long, tapering feelers.

Geographical distribution universal.

For a fuller diagnosis of this remarkable genus, and as to whether the shell should be termed dextral or sinistral, the student is referred to Fischer and Crosse (Miss. Scient. Mex., Mollusca, ii. pp. 53 *et seq.*). It is only necessary to explain here the terms which I have used in the comparative Table of the species and in the descriptions, and it may be noted that numerical measurements help better than words or figures to characterize the different forms of the shell. In order to avoid the terms "upper face" and "lower face," which are used in a different sense by different authors, I prefer to call these parts the *right* or *left side* of the shell, as the disc of the latter is usually borne more or less perpendicularly by the living animal: the right side of the shell is that which corresponds to the right side of the animal (the margin of the aperture being more extended on it than on the left side); in the European *P. corneus* and the species of the subgenus *Helisoma* it is more deeply excavated (umbilicated) than the left, but in the European *P. contortus* and *P. nitidus* the left side is more deeply excavated than the right. The right side is the upperside of most authors, especially of the older ones. The *height* of the shell (alt.) is the greatest dimension of the shell in a plane parallel to the axis or across the whorls (this being usually situated at the aperture), but it must not be confounded with the breadth or *amplitude* of the aperture, which must be measured in the plane of the aperture, more or less oblique to the axis; the more oblique the aperture, the more its amplitude exceeds the height of the shell. The diameter of the aperture is its greatest dimension in the plane of the spiral line, *i. e.* at a right angle to the axis; it can be measured directly in figures which represent the right side (upper face) of the shell, but not in those showing the profile or the left side of the shell. The proportional *relation* of the last whorl is taken from the greatest diameter of the shell which is occupied by the last whorl at the aperture; it must be measured in a line directly from the outer edge of the aperture to the centre of the shell, and is therefore not the actual diameter of the aperture, which extends in another direction: this proportional *relation* is required for the measurement of the more or less rapid increase of the whorls.

Subgen. Helisoma.

Helisoma, Swainson, Treatise on Malacology, p. 337 (1840); Fischer & Crosse, Miss. Scient. Mex., Mollusca, ii. p. 59.

Planorbis, s. strict., *Planorbella*, and *Helisoma*, Binney, Land and Freshw. Shells N. Am. ii. pp. 103, 109, 112.

Shells of comparatively large size; whorls 3–5, swollen, rapidly increasing, obtusely rounded at the periphery, but usually with a more or less distinct spiral angular line near the left, and also in some species near the right, suture; sculpture consisting of broad striæ of growth; surface not very shining, pale yellowish. Aperture usually higher (parallel to the axis of the spiral volution) than broad (in the largest diameter of the shell), or at least as high as broad, often very asymmetrically triangular.

This subgenus is chiefly confined to the continent of North America, but it is also represented in South America by *P. peruvianus*, and in the East Indies by *P. indicus*, Desh. (*coromandelicus*, Beck), and the well-known European *P. corneus*, L., comes rather near it.

1. **Planorbis tenuis.** (Tab. XXI. figg. 1; 7, 7 *a*, young.)

Planorbis tenuis, Dunker, in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, *Limnæacea*, p. 45, t. 9. figg. 14–19, and t. 16. figg. 22–25 (1850*) [1]; v. Mart. Malak. Blätt. xii. p. 55 (1865) [2]; Binney, Land and Freshw. Shells N. Am. ii. p. 113, fig. 189 (copied from Dunker) [3]; Strebel, Beitr. Mex. Land- und Süssw.-Conch. i. p. 42, t. 5. figg. 21–26, *a*, *b*, *c* [4]; Fisch. & Crosse, Miss. Scient. Mex., Mollusca, ii. p. 60, t. 34. fig. 1 [5]; Pilsbry, Proc. Acad. Phil. 1891, p. 321 [6].

Planorbis mexicanus, Ziegler, in litt.[7].

Planorbis fragilis, Dunker, in Martini & Chemnitz, loc. cit. p. 46, t. 10. figg. 41–43 (young shell) [8]; Binney, loc. cit. p. 122, fig. 203 (copied from Dunker) [9].

Allied to the North-American *P. trivolvis*, Say: right side deeply hollowed in the middle, with very convex, rapidly increasing whorls; on the left side all whorls, except the last, forming a plane level overtopped by the last and occupying no more than $\frac{1}{3}$ of the greatest diameter of the shell. Aperture somewhat triangular, the left margin angularly bent near the insertion and then ascending very obliquely to the plane of the spiral.

a. Diam. maj. 22, min. 17, alt. $11\frac{1}{2}$; apert. diam. $10\frac{1}{2}$, ampl. $11\frac{1}{2}$ millim.
b. „ $18\frac{1}{2}$, „ 13, „ 9; „ $8\frac{1}{2}$, „ $9\frac{1}{2}$ „

a. From Dunker's figure; *b*. From a specimen in the Berlin Museum.

Hab. N. Central Mexico: Durango (*Seemann, in coll. Dunker*, given by H. Cuming as *P. tumens*).

Central Mexico: ditches in the neighbourhood of the city of Mexico, plentifully, in company with *Limnæa attenuata* (*Schiede & David* [1 8]; *Deppe & Uhde* [2 4]; *Heilprin* [6]); Mexico city (*Major Rich* [3]); Lake of Chalco (*Méhédin* [5]; *Heilprin* [6]);

* Pp. 21–62 of this work were published in 1850, according to the annual records in Troschel's 'Archiv für Naturgeschichte,' xvii. 2, pp. 101, 129.

Comparative Table of the Species of *Planorbis*.

Nomen.	Testa.				Apertura.	Anfract.		Diam. maj.	Lat. (Alt.).	Apert.		Patria.
	Latere dextro :	Latere sinistro :	Peripheria :	Superficies :		No.	Ult.			Diam.	Ampl.	
Subgen. Helisoma.								mm.	mm.	mm.	mm.	
tenuis, *Dunk.*	tumida, profunde spiratim excavata.	plano-concava, distincte angulata.	ample rotundata.	distincte striata, pallide cornea.	asymmetrice triangularis, vix obliqua.	5	$\frac{1}{3}$	18–22	9–11½	8½–10½	9½–11½	Centr. & E. Mexico.
——, var. boucardi, *F. & Cr.*	spiratim profunde excavata.	plano-concava, angulata.	,,	,,	late subcircularis.	5	$\frac{3}{7}$	18	12½	7½	12½	Centr. Mexico.
——, var. juvenilis, *v. Mart.*	,,	,,	,,	,,	asymmetrice triangularis.	4	$\frac{2}{5}$	15½	8	7	8	Centr. Mexico.
——, var. applanatus, *v. Mart.*	late concava.	modice excavata, subangulata.	,,	distincte striata.	valde asymmetrica, subrotunda, magis obliqua.	5½	$\frac{1}{3}$	24	12	10½	12	Centr. Mexico.
——, var. uhdei, *v. Mart.*	minus profunde excavata.	profunde concava, non angulata.	,,	leviter striata.	asymmetrice triangularis.	5	$\frac{1}{3}$	21	9½	9	11	Centr. Mexico.
——, var. exaggeratus, *v. Mart.*	spiratim profunde excavata.	plano-concava, angulata.	,,	distincte striata, pallide cornea.	subsymmetrica, medio angulata.	?	½	18	11½	10	11½	Centr. Mexico.
——, var. strebelianus, *F. & Cr.*	late conice excavata.	plano-concava, subangulata.	,,	,,	asymmetrice triangularis, vix obliqua.	4½–5	⅓	20–22½	9–11	9½–10½	9½–12	E. Mexico.
wyldi, *Tristr.*	spiratim profunde excavata.	plano-concava, angulata.	,,	distincte striata.	asymmetrice triangularis.	4	$\frac{2}{5}$–$\frac{3}{8}$	11–15	7–8	6½–7	7–8	N., Centr., & W. Guatemala, S.W. Nicaragua, Costa Rica.
tumens, *Carp.*	,,	spiratim excavata, angulata.	,,	tenuiter striata, cornea vel rufo-fusca.	,,	4–5	⅓	11	6	6	6	California, N.W. Mexico.
caribæus, *d'Orb.*	convexa, centro profunde excavata.	convexa, medio impressa, plana.	rotundata.	distincte striata, pallide cornea.	asymmetrice triangularis, vix obliqua.	5–5½	$\frac{2}{7}$–$\frac{3}{10}$	18–21	6–7	6–8	6½–7½	Texas, N., E., & S.E. Mexico, Yucatan, Cuba, &c.
——, var. minor, *v. Mart.*	,,	,,	,,	,,	,,	5–5½	⅓	14–15	5–5½	5–6	5–5½	E. Mexico, N. Guatemala.
——, var. chiapasensis, *F. & Cr.*	,,	convexa, medio impressa, plana, subangulata.	,,	,,	paulum asymmetrica.	5	⅓	10½	5	5	?	S.E. Mexico.
Subgen. Menetus.												
belizensis, *Cr. & F.* ...	convexa, medio late concava.	subplana.	,,	minute striata, pallida.	subasymmetrice exciso-elliptica, vix obliqua.	6	$\frac{3}{7}$	17	5	5	?	S.E. Mexico, Brit. Honduras, N. Guatemala.
orbiculus, *Morel.*	,,	medio paulum concava.	,,	obsolete striatula, pallida.	exciso-elliptica, sat obliqua, marg. dextro stricto.	6	$\frac{2}{7}$	11	2½	3½–4	3	Centr., E., & S.E. Mexico, Yucatan.
nicaraguanus, *Morel.*...	concava.	concava.	obtuse angulata.	confertissime striatula, rufo-cornea.	asymmetrice lunata, sat obliqua.	6	⅓	16	5	6	?	Centr. Nicaragua.

Subgen. GYRAULUS.												
maya, *Morel.*	medio valde concava.	concaviuscula.	obtuse angulata.	minutissime striata, cornea, pellucida.	late lunata, sat obliqua, marg. dextro declivi.	5	$\frac{1}{3}$	9	$2\frac{1}{2}$	3	$2\frac{1}{2}$	S.E. Mexico, Yucatan, W.Guatemala.
retusus, *Morel.*	subplana, centro concava.	late convexiuscula.	rotundata.	minutissime decussata, pallide cornea.	utrinque arcuata.	4–$4\frac{1}{2}$	$\frac{3}{10}$	8	2	3	?	Yucatan.
hondurasensis, *Cless.*..	regulariter concava.	minus concava.	,,	striatula, cornea.	,,	4	$\frac{2}{5}$	5–7	2–$2\frac{1}{2}$	$2\frac{1}{4}$	2	Honduras, Centr. Costa Rica.
tepicensis, *v. Mart.* ..	tumidula, medio valde concava.	modice concava.	,,	leviter striatula, corneo-fusca.	valde obliqua, asymmetrice lunata.	4	$\frac{2}{3}$	6	$1\frac{1}{2}$	$2\frac{2}{3}$	2	N.W. Mexico.
petenensis, *Morel.*.....	medio concava.	medio concava.	obtuse rotundata.	subtilissime striata, luteo-cornea.	rotundata, sat obliqua, marg. dextro stricto.	5	$\frac{2}{5}$	6	2–$2\frac{1}{2}$	$2\frac{1}{2}$	$2\frac{1}{2}$	S.W. Mexico, N. Guatemala, Costa Rica.
æruginosus, *Morel.* ...	subplana, medio leviter concava.	late et profunde concava.	rotundata.	subtiliter striata, opaca.	subovata, sat obliqua, utrinque leviter arcuata.	4	$\frac{3}{10}$–$\frac{1}{3}$	$4\frac{1}{2}$	$1\frac{1}{2}$	$1\frac{1}{2}$	$1\frac{2}{3}$	N. & Centr. Guatemala.
parvus, *Say*	concava.	concava.	subangulata.	striata, pallide cornea.	subelliptica, sat obliqua.	4	$\frac{1}{3}$–$\frac{2}{5}$	4	$1\frac{1}{3}$	$1\frac{1}{2}$	$1\frac{1}{2}$	N. America, S.Centr. Mexico.
fieldi, *Tryon*	modice concava.	modice concava.	rotundata.	vix striatula, griseo-cornea.	asymmetrice lunata, sat obliqua.	3	$\frac{2}{5}$	$5\frac{1}{2}$–6	2	$2\frac{1}{2}$	$2\frac{1}{3}$	S.W. Nicaragua, W. Panama.
panamensis, *Dunk.* ...	plano-convexa, medio impressa.	profunde concava.	,,	obsolete decussata, pallide cornea.	subovalis, obliqua.	$2\frac{1}{2}$–3	$\frac{3}{7}$	3	1	$1\frac{1}{2}$	?	W. Panama.
Subgen. SPIRALINA.												
cultratus, *d'Orb.*	convexiuscula.	plana.	acute carinata.	subtiliter striatula, pallide cornea, nitidula.	semisagittata.	5–6	$\frac{2}{7}$	5–$7\frac{1}{2}$	1–$1\frac{1}{4}$	$2\frac{1}{2}$	$1\frac{1}{2}$	W.Guatemala,Centr. Nicaragua, S. America.
sumichrasti, *Cr. & F.*.	convexa.	,,	angulata.	tenuiter striata, sordide fusca.	rotundato-rhombica, m. dextro arcuato.	5	$\frac{3}{10}$	$5\frac{1}{3}$	$1\frac{3}{4}$	$2\frac{1}{2}$	$2\frac{1}{2}$	E. Mexico.
Subgen. TAPHIUS.												
subpronus, *v. Mart.* ...	tumida, obtuse angulata, medio profunde spiratim excavata.	modice concava, subangulata.	rotundata.	confertim striata, corneo-fusca.	semiovata, valde obliqua, m. dextro declivi.	$3\frac{1}{2}$	$\frac{2}{5}$	5	$2\frac{1}{2}$	$2\frac{1}{2}$	2	S.E. Mexico.
declivis, *Tate*.....	subplana, medio valde concava.	subplana, medio valde concava.	,,	regulariter striata, pallide cornea.	subcircularis, extus subreflexa.	4–5	?	$6\frac{1}{4}$	$1\frac{9}{10}$	?	?	Nicaragua.
Subgen. HIPPEUTIS.												
yzabalensis, *Cr. & F.*...	valde convexa, centro profunde concava.	late concava.	subangulata.	striata, valde nitida, cornea vel rufo-fusca.	subanguste lunata, sat obliqua.	4	$\frac{2}{7}$	4	$1\frac{1}{2}$	$1\frac{1}{4}$	2	S.E. Mexico, N. & E. Guatemala.
Subgen. PLANORBULA.												
obstructus, *Morel*.....	planulata, centro concava.	paulum concava.	rotundata.	tenerrime striata, albido-fulva vel fulvo-brunnea.	semilunata, perobliqua, albo-labiata, intus sexdentata.	4–$5\frac{1}{2}$	$\frac{2}{7}$	4–9	$1\frac{1}{2}$–$2\frac{1}{2}$	$1\frac{2}{3}$–2	2	E. & S. Centr. Mexico, Yucatan, W. Guatemala, W. Panama.
dentiens, *Morel.*	subplanata, medio anguste concava.	vix concava.	obsolete angulata.	subtiliter striata, fusco-cornea.	exciso - circularis, perobliqua, intus sexdentata.	6	$\frac{3}{4}$	6	2	2	2	Brit. Honduras.
——, var. edentula, *F. & Cr.*	,,	,,	,,	,,	rotundata, edentula.	6	$\frac{2}{7}$	$6\frac{1}{2}$	2	...	2	Brit. Honduras.

Lake Chapala, near Guadalajara, State of Jalisco (*Fischer & Crosse* [5]); Jaral, State of Guanajuato (*Schumann*).

E. Mexico: Jalapa and Cordova (*Höge*), Orizaba (*Strebel* [4]).

P. peruvianus, Brod., is, according to the specimens in the Berlin Museum, very near this species, but it is more compressed, with more feeble striæ, and of a paler colour.

The young shell of *P. tenuis* (figg. 7, 7 *a*) is remarkably higher in proportion to its diameter than the adult one, as in all species of this genus; it is very well figured by Strebel [4] (fig. 21 *b*).

The most important forms of this variable species, besides the typical one, are the following:—

Var. *boucardi*.

Planorbis tenuis, var. *boucardi*, Fisch. & Crosse, loc. cit. p. 61, t. 32. figg. 3 *a*, *b* [10]; Pilsbry, loc. cit. p. 322 [11].

Whorls increasing more rapidly in width, those on the right side thus appearing to be more deeply excavated, two only clearly visible; left side as in the typical form; aperture very large, rounded.

Diam. maj. 18, min. 15, alt. $12\frac{1}{2}$; apert. diam. $7\frac{1}{2}$, ampl. $12\frac{1}{2}$ millim.

Hab. Central Mexico: environs of the city of Mexico (*Boucard* [10]); Lake of Chalco, in company with typical specimens (*Heilprin* [11]).

Probably an individual variation.

Var. *juvenilis*, n. (Tab. XXI. fig. 4.)

Planorbis solidus, Wiegmann, in Mus. Berol. (nec Dunker, in Martini and Chemnitz, 1852) [12].

Planorbis tenuis, var., Strebel, loc. cit. pp. 42, 43, t. 5. fig. 21 *c* [13].

Also comparatively very high, with rapidly increasing whorls; right side very deep, the left side very shallow; aperture very large, asymmetrically triangular.

a. Diam. maj. $18\frac{1}{2}$, min. $13\frac{1}{2}$, alt. $8\frac{1}{2}$; apert. diam. 9, ampl. $10\frac{1}{2}$ millim.

b. „ $15\frac{1}{2}$, „ 12, „ $8\frac{1}{2}$; „ $7\frac{1}{2}$, „ $8\frac{1}{2}$ „

a. Strebel's specimen; *b*. Specimen in the Berlin Museum, here figured.

Hab. Central Mexico: ditches near the city of Mexico (*Deppe* [12]); city of Mexico (*Strebel* [13]).

This is in some respects a continuation of the juvenile form into adult age, retaining the comparative altitude (breadth) which is characteristic of the young shell. It resembles the North-American *P. corpulentus*, Say, but differs from it in the less distinct sculpture and the more asymmetrical aperture.

Var. *applanatus*, n. (Tab. XXI. fig. 3.)

Whorls less rapidly increasing, one-half more in number; right side without spiral angular line on the first whorls; left side more deeply hollowed, with the spiral angle nearly obsolete. Aperture typical, but rather small.

Diam. maj. 24, min. $19\frac{1}{2}$, alt. 12; apert. diam. $10\frac{1}{2}$, ampl. 12 millim.

Hab. Central Mexico: Plateau of Mexico (*Uhde*).

This is the reverse of the var. *juvenilis*, the whorls increasing more in diameter and less in height, and thus exaggerating the difference which distinguishes the adult from the young form. It approaches *P. caribæus*, differing from it in the comparatively more inflated form and in the shape of the aperture. Perhaps an individual variation.

Var. *uhdei*, n. (Tab. XXI. fig. 2.)

Planorbis tenuis, var., v. Mart. in Malak. Blätt. xii. p. 56 (1865) [14].

Centre of the shell placed nearer the right side, this side thus being less excavated; the visible part of the penultimate whorl larger, occupying, together with the interior whorls, nearly one-half the diameter; the left side, on the contrary, very deeply excavated, not angulated. Aperture large, rounded.

Hab. CENTRAL MEXICO (*Uhde, in Mus. Berol.*[14]).

Probably an individual variation, or perhaps an abnormally formed specimen, the excavation of the left side being somewhat irregular.

Var. *exaggeratus*, n.

Planorbis tenuis, var., Pilsbry, Proc. Acad. Phil. 1891, p. 322, t. 15. fig. 4[15].

Very inflated, the height of the aperture equal to the greater diameter of the whole whorl; last whorl somewhat angulated in its greatest periphery, especially near the aperture.

Diam. maj. $14\frac{1}{2}$, alt. $14\frac{1}{2}$; apert. diam. 10 millim.

Hab. CENTRAL MEXICO: Lake Patzcuaro (*Heilprin*[15]).

At first sight this seems to be an abnormal form; but as it appears to be confined to one particular lake, where no other form of this polymorphous species has been found, it may be a local variety, analogous to the lacustrine varieties of some of our European freshwater shells.

Var. *strebelianus*.

? *Planorbis trivolvis* or *corpulentus*, Strebel, Beitr. Mex. Land- und Süssw.-Conch. i. p. 39, t. 5. fig. 19 (1873) * [16].

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* Through the kindness of the officials of the Hamburg Museum I have been enabled to examine eight original specimens of this form from Strebel's collection. They chiefly differ from normal *P. tenuis* in having the whorls increasing somewhat more gradually, so that, especially in the left side, the penultimate whorls occupy a larger space, nearly but not quite one-half of the larger diameter. In two of these specimens the angular line of the penultimate whorls in the right side approaches and falls into the suture, thus causing the right side to appear funnel-shaped, the walls falling inward regularly from all sides; while in the normal *P. tenuis* the angular line is somewhat distant from the suture, and the appearance of the right side is that of a thick string coiled spirally inward. Both these characters are very well shown in Strebel's figure, but among his own specimens there are clear transitions to the normal form of *P. tenuis*; as regards the second character, they are even in the majority (6 : 2). Strebel's figures 19 (*strebelianus*) and 21 (*tenuis*) are taken from the most extreme forms, and the very evident difference is exaggerated by the circumstance that the figure 21 represents a not quite fully-grown specimen, according to the form of the aperture, and that the angular spiral lines of the whorls on the left and right sides are scarcely or not at all expressed. From certain

Planorbis ancylostomus, var. *β. strebelianus*, Fisch. & Crosse, Miss. Scient. Mex., Mollusca, ii. p. 63 (1880) [17].

Shell rather large, with more gradually increasing whorls and more funnel-shaped appearance of the right side.

Hab. E. Mexico: Laguna de Los Cocos, Rio Tenoya and ditches and channels adjoining it, all in the environs of Vera Cruz (*Strebel* [16 17]).

2. **Planorbis wyldi.** (Tab. XXI. fig. 5, very young shell.)

Planorbis tumens (Carp.), Mörch, Malak. Blätt. vi. p. 112 (1859) [1]; Fisch. & Crosse, Miss. Scient. Mex., Mollusca, ii. p. 62 (part.), t. 32. figg. 4, 4 *a*, *b*, *c* [2].

Planorbis wyldi, Tristram, P. Z. S. 1861, p. 232 [3].

Planorbis tenuis (Phil.), v. Mart. P. Z. S. 1875, p. 649 [4]; Biolley, Molusc. terr. y fluv. de Costa Rica, p. 16 [5].

Planorbis tenuis, var. *wyldi*, Fisch. & Crosse, Miss. Scient. Mex., Mollusca, ii. p. 62, t. 34. fig. 2 [6].

Planorbis salvinii, Clessin, in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, Limnæiden, p. 207, t. 31. fig. 8 (1886) [7].

Planorbis sp., Stoll, Reisen und Schild. Guatemala, p. 33 (1886) [8].

Very like a small *P. tenuis*, from which it differs in having the whorls increasing a little less rapidly and on the right side usually rather more swollen; the aperture in full-grown specimens is formed as in typical *P. tenuis*, in younger ones more rounded.

a. Diam. maj. 15, min. 12, alt. 8; apert. diam. 7, ampl. 8 millim.
b. „ 14, „ 11, „ 7; „ $6\frac{1}{2}$, „ 4 „
c. „ 11, „ 9, „ 6; „ 5, „ 6 „

a. The largest of Salvin's specimens, from Dueñas; *b*. Apparently full-grown specimens from Rio Reventazon, Costa Rica; *c*. From Fischer and Crosse's figure.

Hab. N. Guatemala: Coban, in ponds (*Bocourt* [2]; *Stoll*).

Central Guatemala: Plateau (Llano) of Guatemala, in shallow ponds and lagoons of Naranjo [8] and Aceituno (*Stoll*).

W. Guatemala: Lake of Dueñas (*Salvin* [3]; *Stoll*), Santiago de Zamora (*Salvin*).

S.W. Nicaragua: near the Volcan de Mombacho (*Örsted* [1]).

Central Costa Rica: common in the environs of San José, in the rivers Tiribi and Torres (*Biolley* [5]).

E. Costa Rica: Rio Reventazon, at Ujarras (*Biolley* [5]); valley of the Alta Coca, near Talamanca (*Pittier*).

S.W. Costa Rica: along the Diquis river, below Terraba (*Pittier*).

The examples from the valley of the Alta Coca, Costa Rica, are very small, measuring 6 millim. only in diameter, and it is difficult to say whether they are full-grown or young. On the contrary, among the specimens collected by O. Stoll at Dueñas there

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varieties of the North-American *P. trivolvis* this shell differs in the less distinct rib-like sculpture, the pale greyish (not yellow or brown) colour, the more flattened middle part of the left side, and, in many specimens, the more asymmetrical shape of the aperture.

is one measuring 18 millim. in diameter, and which forms therefore a connecting-link towards *P. tenuis*.

Very young specimens (fig. 5), if turned the left side upwards, have much the appearance of a *Physa*, which is also the case in other species of the subgenus *Helisoma*: see my remarks on *Planorbis scalaris* from Florida (Sitz.-Ber. Ges. naturf. Freunde, Berlin, 1896, p. 16).

3. **Planorbis tumens.**

Planorbis tenagophilus (d'Orb.), Menke, Zeitschr. f. Malak. 1850, p. 163 [1].

Planorbis tumens, P. Carpenter, Catal. Mazatlan Shells, p. 81 (1857) [2]; Binney, Land and Freshw. Shells N. Am. ii. p. 106, fig. 180 [3]; Fisch. & Crosse, Miss. Scient. Mex., Mollusca, ii. p. 62, t. 33. figg. 3, 3 *a* [4]; ? Clessin, in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, Limnæiden, p. 88, t. 12. figg. 7–9 [5].

Hab. North America: San Francisco (*P. Carpenter* [3]); Petaluma, N. of San Francisco (*A. Gould* [3]).

N.W. Mexico: Mazatlan, not uncommon (*Melchers* [1]; *Reigen* [2–4]).

This species differs from the preceding (*P. wyldi*) in the deep excavation of the left side; in other respects it resembles young specimens of *P. caribæus*. According to P. Fischer's figure, said to be taken from a type, *P. tumens* is very distinct from its allies by the deep excavation of the left side of the shell, the species somewhat resembling the European *P. contortus* in this respect; but in the descriptions and figures of other authors this character is not so distinctly expressed. *P. tumens* differs, however, from *P. tenuis* and *P. wyldi* in the more gradual increase of the whorls, this peculiarity giving it the appearance of a not fully grown *P. caribæus*.

4. **Planorbis caribæus.** (Tab. XXI. figg. 8; 9, 9 *a*, young.)

Planorbis lentus, Say, Am. Conchology, pt. 6 [1] (the Mexican specimens only).

Planorbis tumidus, Pfr. in Wiegmann's Archiv f. Naturg. 1839, p. 354 (sine descr.) [2]; Dunker, in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, *Limnæacea*, p. 39, t. 7. figg. 10–12 (1850) [3]; Binney, Land and Freshw. Shells of N. Am. ii. p. 105, fig. 178 [4] (copy from Dunker); v. Mart. in Malak. Blätt. xii. p. 54 (1865) [5]; Strebel, Beitr. Mex. Land- und Süssw.-Conch. i. p. 40, t. 5. figg. 20, 20 *b* [6]; Fisch. & Crosse, Miss. Scient. Mex., Mollusca, ii. p. 66, t. 34. figg. 4, 4 *a*, *b* [7]; Pilsbry, Proc. Acad. Phil. 1891, p. 322 [8].

Planorbis glabratus (Say), Haldeman, Monogr. Limniades, vii. p. 12, t. 2. figg. 1, 3 (specimen from Mexico) [9].

Planorbis caribæus, d'Orbigny, in Ramon de la Sagra's Hist. fis. polit. y nat. de Cuba, Moluscos, p. 103, t. 13. figg. 17–19 (1845?) [10]; Clessin, in Martini & Chemnitz, Syst. Conch.-Cab., Limnæiden, p. 156 [11] *; Arango, Contrib. a la fauna malac. de Cuba, p. 136 (1878) [12]; Pilsbry, Proc. Acad. Phil. 1891, p. 322 [13].

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* The quoted fig. 5, t. 22, is a copy of d'Orbigny's *P. terverianus*, not of his *P. caribæus*, as correctly stated in the explanation of the plates.

Planorbis intermedius (Phil.), Clessin, loc. cit. p. 196, t. 11. fig. 1 [14].

Planorbis ancylostomus, Crosse & Fisch. Journ. de Conch. xxvii. p. 341 (1879) [15]; Miss. Scient. Mex., Mollusca, ii. p. 63, t. 32. figg. 5, 5 *a*, *b* [16].

More compressed than *P. tenuis*, the penultimate and preceding whorls convex on both sides and occupying about $\frac{2}{3}$ of the greater diameter of the shell; right side deeply excavated in the centre; on the left side only the 2–$2\frac{1}{2}$ innermost whorls flat, forming a tray-like excavation, the penultimate whorl, on the contrary, convex, with a very blunt spiral angular line, which becomes more indistinct in the last whorl. Aperture in the full-grown specimens also very asymmetrical, its right margin obliquely ascending, the left margin more rounded.

a.	Diam. maj.	20,	min.	$18\frac{1}{2}$,	alt.	$6\frac{1}{2}$;	apert. diam.	7,	ampl.	$7\frac{1}{2}$ millim.
b.	„	20,	„	$16\frac{1}{2}$,	„	7;	„	8,	„	7 „
c.	„	$20\frac{1}{2}$,	„	18,	„	7;	„	7,	„	$7\frac{1}{2}$ „
d.	„	18,	„	15,	„	$6\frac{1}{2}$;	„	7,	„	? „
e.	„	$18\frac{1}{2}$,	„	$14\frac{1}{2}$,	„	$5\frac{1}{2}$–$6\frac{1}{2}$;	„	7,	„	$7\frac{1}{2}$ „

a. Specimen collected at Vera Cruz by Uhde; *b*. Specimen in Dunker's collection; *c*. Measurements taken from Dunker's figure [3]; *d*. Crosse and Fischer's *P. ancylostomus*; *e*. Largest of Strebel's specimens.

In some examples the last whorl is a little widened near the aperture, and also at two or three other places (our fig. 8), which probably indicate former stoppages in the growth.

Hab. North America: Texas (*Lieut. Couch and G. Wurdeman* [4]).

N. Mexico: Ojo de Agua (*Say* [1]).

E. Mexico: Vera Cruz (*Uhde* [5]; *Strebel* [6]; *De Cande* [10]; *Sallé* [15 16]; *Heilprin* [8]; *Liebmann* [14]; *Höge*); Jalapa (*Höge*); Orizaba (*Heilprin* [8]).

S.E. Mexico: Chiapas (*Sallé* [15 16]).

Yucatan: Shkolak (*Heilprin* [13]).

Antilles: Cuba (*Pfeiffer* [2 3]; *Gundlach* [12]; *Arango* [12]); Puerto Rico (*Krug* [12]).

Var. *minor*.

Planorbis capillaris, Beck, Index Moll. p. 119 (1837) (sine descr.) [17].

Planorbis intermedius, Philippi, in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, Limnæaceen, p. 39, t. 16. figg. 18, 19 (1850) [18] (nec *intermedius*, Charpentier, 1837).

Planorbis albescens, Uhde, in litt.[19] (nec *P. albicans*, Spix, 1827, *nec* Pfr. 1839).

Planorbis tumidus (Pfr.), Küster, in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, Limnæaceen, p. 40, t. 9. figg. 1–3 [20]; v. Mart. in Malak. Blätt. xii. p. 54 (1865) [21] (part.); Strebel, Beitr. Mex. Land- und Süssw.-Conch. i. p. 41 ("Viele Exemplare," etc.), t. 5. fig. 20 *a* [22].

Planorbis tumens (Carp.), Fisch. & Crosse, Miss. Scient. Mex., Mollusca, ii. p. 62 (part.), t. 32. figg. 4, 4 *a*, *b*, *c* [23].

Planorbis intermedius, var. *minor*, Clessin, in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, Limnæiden, p. 197, t. 11. fig. 2 [24].

Planorbis guatemalensis, Clessin, loc. cit. p. 209, t. 32. fig. 7 (1889) [25].

Of smaller size: diam. maj. 14–$15\frac{1}{2}$, min. $11\frac{1}{2}$–12, alt. 6–$6\frac{1}{2}$; apert. diam. $5\frac{1}{2}$–6, ampl. 6–$6\frac{1}{2}$ millim.

Hab. E. Mexico: Vera Cruz (*Uhde* [19 21]; *Strebel* [22]; *Höge*), in brackish marshes (*Liebmann* [18 21]); Jalapa (*Höge*).

N. Guatemala: Coban (*Bocourt* [23]); Guatemala, without nearer indication of locality (*Morelet* [25]).

Var. *chiapasensis.*

Planorbis ancylostomus, var. *chiapasensis*, Fisch. & Crosse, Miss. Scient. Mex., Mollusca, ii. p. 63, t. 34. figg. 5, 5 *a*, *b* [26].

Very small: diam. maj. 10½, alt. 5 millim.; left side with a distinct spiral angle; aperture less asymmetrical.

Hab. S.E. Mexico: Chiapas (*Sallé* [26]).

This form has very much the appearance of a not full-grown shell, but it is more compressed than young shells of the typical *P. caribæus* of the same diameter.

P. caribæus * is in most respects very near *P. tenuis*, but at first sight very distinct from it by the more gradual increase of the whorls, the more compressed form, and the greater space occupied by the penultimate whorl, as well as by the less conspicuous difference between the two sides of the shell. All these differences, however, are due to a later stage of growth, appearing more distinctly in the last whorls, as in young shells of about 10 millim. in diameter, and with four whorls, the deep spiral excavation of the right side and the flat tray-like excavation of the left side are essentially alike in both species (figg. 7, 9), and the only real difference between them is in the

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* As regards the name to be used for this species and what localities to quote, there are several difficulties. (1) Do the Cuban and Mexican specimens belong to one and the same species, or are they distinct? Several authors, including myself, formerly separated them, because the figure given by Dunker [3], from a Cuban specimen, exhibits a less asymmetrical form than the full-grown Mexican ones; nevertheless, in d'Orbigny's original figure of *P. caribæus* the aperture is very asymmetrical, and I find on examining the Cuban shells given to the Berlin Museum by J. Gundlach that they have a triangular or irregularly pentangular aperture like that of the Mexican examples, and exhibit no other constant difference; therefore I prefer now to follow d'Orbigny [10] and Dunker [3] in uniting them. (2) *P. capillaris*, Beck (1837), has never been defined; it can be recognized only by the place which the author has assigned to it near *P. banaticus* and *P. coromandelicus*, and by a specimen in Dunker's collection from Steenstrup bearing the name *P. capillaris*. *P. tumidus*, L. Pfeiffer [2] (1839), also undefined, is said to resemble *P. fragilis*, a species undescribed at that time; the first published description and figure of *P. tumidus*, that by Dunker [3], is clearly subsequent to that of *P. caribæus*, d'Orb.[10], as Dunker himself quotes d'Orbigny's name and publication. Both names, *P. tumidus*, Dunk., and *P. caribæus*, d'Orb., were applied originally to Cuban specimens, but d'Orbigny [10], as well as Dunker [3], includes also Mexican shells under *P. caribæus*. If the two are regarded as one species, *P. caribæus* has priority, and the name *P. tumidus* would be best dropped. If necessary, the Mexican shell could always be separated from the Cuban one under the name *P. ancylostomus*, Cr. & Fisch.[15]. (3) It is doubtful whether this species really inhabits Central Mexico: in a former paper [5] I have quoted the city of Mexico as a locality for it, on the authority of Uhde, as there are two blackish incrusted specimens in the Berlin Museum so labelled by him—they belong to the var. *minor*, which is rather widely distributed; but as neither Strebel, nor Boucard, nor Heilprin has found this species in the environs of the city of Mexico, this locality requires confirmation. Dunker [3] also adds to its distribution "Vamba (*Hegewisch*)"; this place is said to be in the State of Vera Cruz by Fischer and Crosse, but in the label in Dunker's collection it is ascribed to the western shore-regions of Mexico. Pilsbry [3 13] gives, as distinct species, *P. tumidus*, from Vera Cruz and Orizaba, and *P. caribæus*, from Yucatan; one of these possibly belongs to our var. *minor*.

proportional relation of the height of the shell to its diameter, which is greater in *P. tenuis*, but individually variable in both. *P. caribæus* bears a similar relationship to *P. tenuis* that *P. glabratus*, Say, does to *P. trivolvis*, or, within Europe, *P. banaticus* to *P. corneus*. Amongst the species of the subgenus *Helisoma*, *P. caribæus* approaches nearest the subgenus *Menetus*.

Haldeman (Monogr. Limniades, vii. p. 12) says that figg. 1 and 3 of the tab. 2 of his *P. glabratus* were drawn from Mexican (?) shells; they somewhat resemble *P. caribæus*.

Subgen. Menetus.

Menetus, A. & H. Adams, Gen. Moll. ii. p. 262 (1858).

Shells of moderate size and rather depressed form; whorls more than five, gradually or more rapidly increasing, rounded or slightly angulated at the periphery. Surface smooth. Aperture as broad as or broader than high; dextral and sinistral margins not much arcuated nor angular.

This subgenus is mainly peculiar to South America (*P. cumingianus*, Dunk.) and the Antilles (*P. guadeloupensis*, Sow.); the species inhabiting Mexico and Central America are chiefly recognizable by the large number of whorls.

It is distinguished from *Helisoma* by various characters, though there are several intermediate forms, i. e. *P. caribæus*, from Mexico, *P. belizensis*, from Central America, and *P. bahiensis*, from Brazil.

5. **Planorbis belizensis.**

Planorbis belizensis, Crosse & Fisch. Journ. de Conch. xxvii. p. 342 (1879) [1]; Miss. Scient. Mex., Mollusca, ii. p. 68, t. 32. figg. 6, 6 *a*, *b* [2].

Hab. S.E. Mexico: Tabasco (*Morelet* [2]).

British Honduras: Belize (*Bocourt* [1 2]).

N. Guatemala: Coban and San Miguel Tucuru (*Bocourt* [2]).

This species seems to form a connecting-link between the subgenera *Helisoma* and *Menetus*: the aperture is scarcely oblique, and the left margin of it ascends rather obliquely outwards, as in *Helisoma*; but the number of whorls (6) and the general appearance bring it near the following, *P. orbiculus*.

6. **Planorbis orbiculus.**

Planorbis simplex, Beck, Index Moll. p. 120 (1837) (sine descr.) [1].

Planorbis orbiculus, Morelet, Test. Noviss. i. p. 17 (1849) [2]; Reeve, Conch. Icon. xx., *Planorbis*, t. 3. fig. 20 [3]; Fisch. & Crosse, Miss. Scient. Mex., Mollusca, ii. p. 70, t. 32. figg. 9, 9 *a*, *b*, *c* [4]; Clessin, in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, Limnæiden, p. 138, t. 17. fig. 12 [5]; Pilsbry, Proc. Acad. Phil. 1891, p. 322 [6].

Planorbis haldemani, Dunker, in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, Limnæaceen, p. 59, t. 10. figg. 38–40 (1850) [7]; Binney, Land and Freshw. Shells of N. Am. ii. p. 110, fig. 185 (copied from Dunker) [8]; v. Mart. in Malak. Blätt. xii. p. 56 (1865) [9]; Strebel, Beitr. Mex. Land- und Süssw.-Conch. i. p. 44, t. 5. fig. 22 [10] (nec *P. haldemani*, C. B. Adams, from Jamaica, 1849).

Planorbis liebmanni, Dunker, loc. cit. p. 59, t. 10. figg. 32–34 (young) [11]; Binney, loc. cit. p. 108, fig. 183 (copied from Dunker) [12]; Fisch. & Crosse, loc. cit. p. 71 [13].

Planorbis depressus, Uhde, in litt.[14].

Planorbis micromphalus (Dunker), Strebel, loc. cit. p. 47 [15].

Hab. Central Mexico: near the city of Mexico (*Liebmann* [7 8]); Mexico, without nearer indication of locality [1 10].

S. Central Mexico: San Carlos, east of Oaxaca (*Höge*).

E. Mexico: Vera Cruz (*Liebmann* [11 13]; *Uhde* [9 14]; *Strebel* [10]; *Höge*); San Juan, near Vera Cruz (*Heilprin* [6]).

S.E. Mexico: Balancan, near San Juan Bautista, State of Tabasco (*Morelet* [4]).

Yucatan: La Palizada, on the frontier of Tabasco (*Morelet* [2 4]); Laguna de Terminos (*Berendt* [10]); Carmen Island, in the entrance to this lagoon (*Morelet* [4]).

In some specimens of this species the penultimate whorl on the left side is in the same level with the last, in others somewhat excavated. I have not seen an example with the aperture so distinctly enlarged and expanded (like that of *P. campanulatus*) as it is described and figured by Dunker [7]; this may be an individual variation.

P. havanensis, Pfr., from Cuba, comes near *P. orbiculus*; but it is a little less compressed, and the left side is more excavated, with the visible part of the penultimate whorl comparatively smaller.

There is a similar shell in the Berlin Museum, from Diquis, below Terraba, Costa Rica; but it is too imperfect for identification, and is only mentioned here to record the presence of the subgenus *Menetus* in Costa Rica.

P. orbiculatus ("Morelet"), Sowerby, in Reeve's Conch. Icon. xx., *Planorbis*, t. 3. fig. 22, seems to belong to a different species.

7. **Planorbis nicaraguanus.** (Tab. XXI. fig. 10.)

Planorbis nicaraguanus, Morelet, Test. Noviss. ii. p. 14 (1851) [1].

? *Planorbis nicaraguanus*, Clessin, in Martini & Chemnitz, Syst. Conch.-Cab., Limnæiden, p. 207, t. 31. fig. 10 [2].

? *Planorbis tumidus* (Pfr.), Tate, Am. Journ. Conch. v. p. 158 (1870) [3].

Hab. Central Nicaragua: Lake of Nicaragua (*Morelet* [1 2], *Tate* [3]); Rio San Juan (*Tate* [3]).

I am indebted to Mr. E. A. Smith for a sketch of a typical specimen from Morelet's collection, now in the British Museum (fig. 10). He informs me that the greater

diameter is really 16 millim., as stated by Morelet, not 26 millim. as given by Clessin [2], whose figures, however, measure not more than 20–21 millim. The form of the aperture in Clessin's figure, moreover, does not agree satisfactorily with that of Morelet's specimen; it is therefore somewhat doubtful whether Clessin had a specimen of the same species before him.

Subgen. Gyraulus.

Gyraulus, Agassiz, in Charpentier's Moll. Terr. et Fluv. Suisse (Mém. Soc. Helv. de Sci. Nat. i.), p. 21 (1837); Moquin-Tandon, Moll. Terr. et Fluv. Fr. p. 438 (1855); Hartmann, Gasteropoden d. Schweiz, p. 89 (1844); Binney, Land and Freshw. Moll. of N. Am. ii. p. 128.

Nautilina (J. E. F. Stein, 1850), H. & A. Adams, Gen. Moll. ii. p. 263.

Shells of small size, with 3–5 somewhat rapidly increasing whorls, rounded or obtusely angulated at the periphery. Surface rather dull, not very shining, with faint striæ of growth, in some species crossed by very faint spiral lines (*P. albus*, L., from Europe; *P. retusus*, Morelet, from Central America). Aperture nearly as high as broad, usually very oblique.

Cosmopolitan.

8. **Planorbis maya.** (Tab. XXI. fig. 13.)

Planorbis maya, Morelet, Test. Noviss. i. p. 16 (1849) [1]; Fisch. & Crosse, Miss. Scient. Mex., Mollusca, ii. p. 72, t. 33. figg. 4, 4 *a*, *b*, *c* [2]; ? Clessin, in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, Limnæiden, p. 208, t. 32. fig. 2 [3]; Pilsbry, Proc. Acad. Phil. 1891, p. 322 [4].

Near *P. orbiculus*, Morel., but smaller and subangulate.

Hab. S.E. Mexico: Isthmus of Tehuantepec (*Sumichrast* [2]).

Yucatan: Merida (*Heilprin* [4]); Tabi (*Godman*); city of Campeche, in cisterns (*Morelet* [1–3]).

W. Guatemala: Antigua, in wells (*Stoll*).

In general form this species approaches the subgenus *Menetus*, but it has not more than five whorls. Some of Mr. Godman's specimens, from Tabi, show several white radial markings in the first-formed whorls (see fig. 13), which seem to indicate that in the young shell there were periodical thickenings in its substance, somewhat as in the subgenus *Segmentina*; neither Morelet nor Fischer and Crosse mention them.

It is rather doubtful whether Clessin's description and figure really apply to this species, as his shell is of larger size (diam. 12, height 3 millim.; that of Morelet and Fischer and Crosse measuring diam. 9, height $2\frac{1}{2}$ millim.), and has nevertheless only four whorls instead of five; but in counting the whorls authors may easily disagree.

9. **Planorbis retusus.**

Planorbis retusus, Morelet, Test. Noviss. i. p. 17 (1849) [1]; Fisch. & Crosse, Miss. Scient. Mex., Mollusca, ii. p. 73, t. 32. figg. 10, 10 *a–c* [2]; Pilsbry, Proc. Acad. Phil. 1891, p. 322 [3].

Planorbis planus, Clessin, in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, Limnæiden, p. 222, t. 33. fig. 6 [4].

Similar to the preceding, but flatter on the right side.

Hab. YUCATAN: Carmen Island (*Morelet* [1 2]); Shkolak, between Merida and Valladolid (*Heilprin* [3]).

This species is easily distinguishable by the flatness of the right side. Clessin had his specimen also from Morelet, but apparently without name and without indication of locality.

10. **Planorbis hondurasensis.**

Planorbis hondurasensis, Clessin, in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, *Limnæidæ*, p. 164, t. 24. fig. 2 (1878) [1] *.

Hab. HONDURAS: Santa Rosa (*Hjalmarson* [1]).

CENTRAL COSTA RICA: Rio Torres (*Biolley*).

11. **Planorbis tepicensis,** sp. n. (Tab. XXI. fig. 14.)

Testa tumidula, vix striatula, corneo-fusca, latere dextro medio profunde concavo, latere sinistro minus concavo, peripheria rotundata; anfr. 4, utrinque convexi, regulariter crescentes, ultimus ad aperturam $\frac{1}{3}$ diametri occupans; apertura sat obliqua, intus albo-labiata, asymmetrice lunata, margine dextro leviter arcuato, margine sinistro ad insertionem magis arcuato et deinde oblique ascendente.

Diam. maj. 6, min. 5, lat. $1\frac{1}{2}$; apert. diam. $2\frac{2}{3}$, ampl. 2 millim.

Hab. N.W. MEXICO: Tepic, State of Jalisco (*Richardson*).

Although there is no striking peculiarity about this species, I cannot identify it with any one of those described by writers on American conchology. Its chief characters are the white lip of the aperture and the form of the sinistral margin, this last-mentioned peculiarity suggesting an affinity with the subgenus *Helisoma*; but the plane of the aperture is much more oblique than in the species of that section of *Planorbis*.

12. **Planorbis petenensis.**

Planorbis petenensis, Morelet, Test. Noviss. ii. p. 15 (1851) [1]; Fisch. & Crosse, Miss. Scient. Mex., Mollusca, ii. p. 74, t. 33. figg. 5, 5 *a–c* [2]; Biolley, Moluscos Terr. y Fluv. de Costa Rica, p. 17 [3].

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* Clessin gives the locality as "Sta. Maria, Honduras"; but on the label in Dunker's collection it is clearly written "Sta. Rosa." His measurements, diam. 8, alt. 3 millim., are also incorrect (they should be diam. 5, alt. 2), according to a letter received from him in October 1898. Dunker's largest specimen measures diam. 7, alt. $2\frac{1}{2}$ millim.

Hab. S.W. Mexico: Cacoprieto, on the Isthmus of Tehuantepec (*Sumichrast* [2]).
N. Guatemala: Lago de Itza, Peten (*Morelet* [1 2]).
Central Costa Rica: near San José, in the Rio Torres and in some pools which receive their water from that river (*Biolley* [3]).
S.W. Costa Rica: Laguna between Lagarto and Boruca (*Pittier*).

13. **Planorbis æruginosus.**

Planorbis æruginosus, Morelet, Test. Noviss. ii. p. 15 (1851) [1]; Fisch. & Crosse, Miss. Scient. Mex., Mollusca, ii. p. 74, t. 32. figg. 8, 8 *a*, *b*, *c* [2].

Right side rather flat, left broadly excavated.

Hab. N. Guatemala: in marshes adjoining the Lake of Yzabal (Golfo Dulce) (*Morelet* [1 2]).
Central Guatemala: Guatemala city, in wells (*Stoll*).

Morelet's specimens exhibit a rusty, Stoll's a blackish incrustation.

14. **Planorbis parvus.**

Planorbis parvus, Say, in Nicholson's Encycl. (Amer. edit.), t. 1. fig. 5 [1]; Haldeman, Monogr. Limniades, vii. p. 27, t. 4. figg. 19–22 [2]; Binney, Land and Freshw. Moll. N. Am. ii. p. 133, figg. 222–224 [3]; Sowerby, in Reeve's Conch. Icon. xx., *Planorbis*, t. 11. fig. 87 [4]; Clessin, in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, Limnæiden, p. 133, t. 21. fig. 1 [5]; Pilsbry, Proc. Acad. Phil. 1891, p. 322 [6].

Hab. North America: from Canada and South of Hudson's Bay (Moose Factory) to Georgia and Yellowstone River [3].
S. Central Mexico, Yautepec, State of Morelos (*Heilprin* [6]).

According to Pilsbry [6] the Mexican specimens are in every respect typical; but it is strange that no other collector should have found it in the much-explored parts of Eastern and Central Mexico.

15. **Planorbis fieldi.** (Tab. XXI. fig. 6.)

Planorbis fieldi, Tryon, Proc. Acad. Phil. 1863, p. 281, t. 1. figg. 4, 5 [1]; Tate, Am. Journ. Conch. v. p. 159 (1870) [2]; Schmeltz, Catal. Mus. Godeffroy, v. p. 88 (1870) [3]; Clessin, in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, Limnæiden, p. 154, t. 22. fig. 10 [4].

Also with rapidly enlarging whorls, but more inflated and with the left whorl less excavated.

Hab. S.W. Nicaragua: in pools by the margin of the Lake of Nicaragua, at Granada (*Tate* [2]).
W. Panama (*Capt. Field* [1]).

Clessin [4] gives Mousson as author and the Samoa Is. as locality for this species: probably he was deceived by the fact that *P. fieldi* is enumerated in the Catalogue of the Museum Godeffroy [3] (the shells in this museum being chiefly from the Samoa and Viti Islands); Nicaragua, however, is there mentioned correctly as the locality for it.

The specimen in the Berlin Museum, acquired from Godeffroy, agrees very well with Clessin's description and figure, but not so well with the description of Tryon, who gives only three whorls.

16. **Planorbis panamensis.**

Planorbis panamensis, Dunker, P. Z. S. 1848, p. 41 [1]; Sowerby, in Reeve's Conch. Icon. xx. *Planorbis*, t. 12. fig. 95 [2].

A very small shell, with rapidly enlarging whorls and deeply excavated left side. Diam. 3 millim.

Hab. W. Panama: Panama, in small streams (*coll. Cuming* [1 2]).

Only known to me from the description and figure.

Subgen. Spiralina.

Spiralina, Hartmann, Gasteropoden d. Schweiz, i. tab. (1840) (sine descr.)*.

Spirorbis, Swainson, Treatise of Malacology, p. 337 (1840) (nec *Spirorbis*, Daudin, 1800, Annulata).

Gyrorbis, Moquin-Tandon, 1855 (part.); Kobelt, Catalog d. europ. Binnenconch. p. 57 (1871); Clessin, Deutsche Excursions-Mollusken-Fauna, 1884, p. 412 (nec *Gyrorbis*, Fitzinger, subgen. of *Valvata*, 1833).

Diplodiscus, Westerlund, Act. Soc. pro Fauna et Flora Fenn. xiii. p. 218 (1897) (nec *Diplodiscus*, Diesing, 1850).

Shells of moderate or small size, with 5–8 gradually increasing whorls, more or less sharply keeled at the periphery, flatter on the left side than on the right; surface with faint striæ of growth, not very shining. Aperture broader than high, lanceolate or asymmetrically rhomboidal.

European (*P. vortex*, L., &c.) and Tropical-American.

17. **Planorbis cultratus.**

Planorbis cultratus, d'Orbigny, in Ramon de la Sagra's Hist. fis. polit. y nat. de Cuba, Moluscos, p. 105, t. 14. figg. 5–8 (1845?) [1]; v. Mart. Binnen-Mollusken Venezuela's, p. 4, t. 2. fig. 10 [2]; Reeve, Conch. Icon. xx., *Planorbis*, t. 13. fig. 106 [3]; Fisch. & Crosse, Miss. Scient. Mex., Mollusca, ii. p. 68, t. 32. figg. 7, 7 *a*, *b*, *c* [4]; Clessin, in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, Limnæiden, p. 148, t. 22. fig. 3 [5].

Planorbis dueñasianus, Tristram, P. Z. S. 1861, p. 232 [6].

Planorbis kermatoides (d'Orb.), Tate, Am. Journ. of Conch. v. p. 158 (1870) [7].

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* *Spiralina* was used by Hartmann only as a "nomen nudum," without description or indication of species; but as he has distinguished all the other European subgenera of *Planorbis* by different names in the same work, it is clear that he recognized this group, a fact verified by myself when examining his collection in the Museum at St. Gallen in 1890, where *P. depressus*, Mich., a variety of *P. vortex*, and *P. leucostomus*, Millet (a species nearly allied to *P. vortex*), are labelled with the name *Spiralina*. *Gyrorbis* is wrongly ascribed to Agassiz by Kobelt and Clessin, the latter quoting even a page in the paper of Charpentier (1837), in which, however, the name *Gyraulus* (not *Gyrorbis*) is to be found; it was first proposed by Moquin-Tandon [Moll. Terr. et Fluv. Fr. p. 428 (1855)] for a section of *Planorbis* comprising *P. carinatus*, *P. marginatus*, *P. vortex*, and *P. spirorbis*, but the name is preoccupied by Fitzinger (1833) for a subgenus of *Valvata*.

Hab. W. Guatemama: Lake of Dueñas (*Salvin* [6]).
Central Nicaragua: San Agustin, near Acoyapa, in marshy pools (*Tate* [7]).
South America: Venezuela [2], N. Brazil, Paraguay.
Antilles: Martinique (*Candé*).

I have not seen Salvin's or Tate's specimens of this species, and I include it in our list solely on the authority of Fischer and Crosse, who, however, do not appear to have had Central-American specimens before them. For Strebel's statement concerning it, quoted by Fischer and Crosse, consult the following.

18. **Planorbis sumichrasti.**

Planorbis, sp. ?, Strebel, Beitr. Mex. Land- und Süssw.-Conch. i. p. 46, t. 5. fig. 24 [1].
Planorbis sumichrasti, Crosse & Fisch. Journ. de Conch. xxvii. p. 342 (1879) [2]; Miss. Scient. Mex., Mollusca, ii. p. 69, t. 33. figg. 6, 6 *a–d* [3].

Somewhat less compressed than *P. cultratus*, with the last whorl comparatively larger and the keel less acute.

Hab. E. Mexico: in the alluvial deposits on the beach (*Strebel* [1]); Cacoprieto, Isthmus of Tehuantepec (*Sumichrast* [2 3]).

Although Strebel's measurements coincide exactly with those given by Fischer and Crosse for their *P. cultratus* (from a specimen of unknown origin in the Sallé collection), the figures (corroborated by an example presented by Strebel to the Berlin Museum) show manifestly that his shell belongs to *P. sumichrasti*.

Subgen. Taphius.

Taphius, H. & A. Adams, Gen. Moll. p. 202 (1858).

Shell swollen and very concave on the right side, like that of *Helisoma*, but with the last whorl turning to the left near the aperture, which thus becomes very oblique.

Known from the Andes of Peru (*P. andecolus*, d'Orb.), and the Lake of Valencia, Venezuela (*P. pronus*, v. Mart.), as well as from Central America.

19. **Planorbis subpronus**, sp. n. (Tab. XXI. fig. 15.)

Testa subinflata, solidula, confertim striatula, obscure cornea, latere dextro profunde, sinistro mediocriter spiratim excavato, utraque excavatione subangulatim cincta, peripheria rotundata; anfr. $3\frac{1}{2}$, celeriter crescentes, ultimus prope aperturam sensim descendens; apertura valde obliqua, semiovata, margine dextro leviter descendente, externo et sinistro bene arcuatis, columellari distincto, brevi, obliquo; paries aperturalis parum convexus, callo tenui textus.

Diam. maj. 5, min. 4, alt. 2; apert. diam. $2\frac{1}{2}$, ampl. 2 millim.

Hab. S.E. Mexico: Amatitan, State of Tabasco (*Conradt, in Mus. Berol.*).

Allied to *P. pronus*, v. Mart. [Binnen-Mollusken v. Venezuela, p. 42, t. 2. fig. 5 (1873)], but smaller, without spiral furrows, and with the last whorl less expanded at the aperture. In both species the width of the aperture does not exceed the absolute

breadth (height) of the whole shell, although the aperture is very oblique, owing to its right margin deviating considerably to the left side.

As this species somewhat resembles *P. obstructus*, I have broken up a specimen and ascertained that there are no internal teeth present.

20. **Planorbis declivis.**

Planorbis declivis, Tate, Amer. Journ. of Conch. v. p. 159 (1870) [1].

Hab. NICARAGUA: marshy pools at San Agustin, near Acoyapa, in company with *Planorbis cultratus* and *Ancylus excentricus* (*Tate* [1]).

According to the description (a figure is not given), this species differs from the preceding, *P. subpronus*, in the much more depressed shell, with 4–5 whorls, the nearly circular aperture, and the (slightly) reflexed outer margin.

Obs.—*Planorbis declivis*, Sowerby, in Reeve's Conch. Icon. xx., *Planorbis*, fig. 29 (1876) (locality unknown), belongs to a very different species; it is probably a variety of *P. trivolvis*, Say. *P. declivis* (Gould), Clessin, in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, Limnæiden, p. 142, t. 17. fig. 13, from Cuba, differs also from Tate's description. I cannot find any trace of a *P. declivis* in A. Gould's conchological papers.

Subgen. HIPPEUTIS.

Hippeutis, Agassiz, in Charpentier's Moll. Terr. et Fluv. Suisse, p. 22 (1837) (part.); Hartmann, Gasteropoden d. Schweiz, p. 51 (1840).

Drepanotrema, Fischer & Crosse, Miss. Scient. Mex., Mollusca, ii. p. 59 (1880).

Shell particularly glossy, of small size, with few rapidly increasing whorls, more or less angulated at the periphery, each succeeding whorl involving a considerable portion of the preceding. Aperture simple, more or less rhomboidal. Distinct from *Segmentina*, Flem., by the absence of internal tooth-like thickenings.

Known from Europe, West Africa (*P. benguelensis*), Brazil and Argentina (*P. anatinus*), and Eastern Asia (*P. umbilicalis* and *P. largillierti*); the two last-mentioned species form a connecting-link, in the general shape of the shell, with the Central-American forms.

21. **Planorbis yzabalensis.**

*Planorbis isabel**, Sowerby, in Reeve's Conch. Icon. xx., *Planorbis*, t. 12. fig. 101 (1877) [1]; Clessin, in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, Limnæiden, p. 217 [2].

Planorbis yzabalensis, Crosse & Fisch. Journ. de Conch. xxvii. p. 342 (1879) [3]; Miss. Scient. Mex., Mollusca, ii. p. 75, t. 33. figg. 2, 2 *a–c* [4].

Very distinct by the inflated convexity of the right side and the even form of the left.

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* The word "*isabel*" used by Sowerby is evidently a misspelling of Yzabal (or Izabal), this name applying both to the lake (sometimes termed Golfo Dulce) and the town on its banks.

Hab. S.E. Mexico: Balancan, State of Tabasco (*Morelet* [3 4]).

N. Guatemala: Rio Usumacinta [1].

E. Guatemala: Lake of Yzabal (*Morelet* [2 3 4]).

The shell figured by Sowerby [1] without doubt belongs to the species described and figured by Fischer and Crosse [3 4]; it had been previously noticed, but not described, under the name "*P. isabel*" by H. & A. Adams [Gen. Moll. ii. p. 264 (1858)].

Subgen. Planorbula.

Planorbula, Haldeman, Monogr. Limniades, Suppl. to part 1, p. 2 (1840); H. & A. Adams, Gen. Moll. ii. p. 265; Binney, Land and Freshw. Shells of N. Am. ii. p. 136; Fischer & Crosse, Miss. Scient. Mex., Mollusca, ii. p. 76.

Shell convex, not particularly glossy, with oval, very oblique aperture, and a set of internal tooth-like thickenings in the interior somewhat behind it.

Distinct from *Segmentina*, Flem., by the absence of the particularly glossy surface and the disposition of the internal thickenings, which in *Planorbula* follow the spiral direction and are present in one set only, those first formed being absorbed before the later ones appear, while in *Segmentina* the thickenings run across the whorl and are present in several sets. The absence of these teeth in some specimens (*P. dentiens*, var. *edentula*) shows that this character cannot be regarded as of generic value.

Known from North America, Central America, and the Antillean islands; one species in Egypt (*P. alexandrinus*, Ehrenberg).

22. **Planorbis obstructus.**

Planorbis obstructus, Morelet, Test. Noviss. i. p. 17 (1849) [1].

Planorbula obstructa, Fisch. & Crosse, Miss. Scient. Mex., Mollusca, ii. p. 278, t. 33. figg. 8, 8 *a–d*, and t. 34. figg. 7, 7 *a–d* [2]; Pilsbry, Proc. Acad. Phil. 1891, p. 322 [3].

Segmentina doubilli, Tristram, P. Z. S. 1861, p. 232 [4].

Planorbis doubilli, Fisch. & Crosse, loc. cit. p. 80 [5].

Planorbis berendti, Tryon, Amer. Journ. of Conch. ii. p. 10, t. 2. figg. 14–16 (1866) [6]; Strebel, Beitr. Mex. Land- und Süssw.-Conch. i. p. 45, t. 5. fig. 23 [7]; Clessin, in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, Limnæiden, p. 198, t. 30. figg. 3, 4 [8].

Hab. E. Mexico: Quilate, near Misantla (*Höge*); Orizaba (*Botteri* [6]); Vera Cruz (*Liebmann, in coll. Dunker*; *Höge*); Rio Tenoya, Vera Cruz, and in the alluvial deposits on the beach (*Strebel* [7]).

S. Central Mexico: San Carlos, east of Oaxaca (*Höge*); Isthmus of Tehuantepec (*Sumichrast* [2]).

Yucatan: Carmen Island (*Morelet* [1 2]); Ticul (*Heilprin* [3]).

W. Guatemala: Lake of Dueñas (*Salvin* [4 5]); Escuintla (*Conradt, in Mus. Berol.*).

W. Panama: Panama (*Dunker, in coll. Albers*).

The Vera Cruz specimens in the Berlin Museum vary from 4–5½ millim. in diameter, 1⅔–2 in height, and 1¾–2 in diameter of the aperture; but Strebel [7] gives

a diameter of 8 and a height of $2\frac{1}{4}$ millim. to his Vera Cruz examples. Those from Escuintla, Guatemala, average 5 millim. in diameter, $1\frac{1}{2}$ in height, and $1\frac{2}{3}$ in the diameter of the aperture; they are of a shining brown colour. Tristram [4] gives, for *P. doubilli*, 9 millim. in diameter and $2\frac{1}{2}$ in height: neither Fischer and Crosse nor I have seen his specimen; but the French authors mention it as a distinct species, observing at the same time that they cannot find any important difference between it and *P. obstructus*, and that *P. doubilli* may be regarded as a large variety of that species. As Strebel mentions examples of nearly the same size from Vera Cruz, it cannot be admitted even as a geographical variety.

The specimen from Panama in Albers's collection is labelled *P. dentatus*, Gould, a MS. name mentioned by H. & A. Adams (Gen. Moll. ii. p. 265); but it is impossible to say whether this name is correctly applied.

23. **Planorbis dentiens.**

Planorbis dentiens, Morelet, Test. Noviss. i. p. 18 (1849) [1].

Planorbula dentiens, Fisch. & Crosse, Miss. Scient. Mex., Mollusca, ii. p. 80, t. 33. figg. 7, 7 *a*, *b*, *d* [2].

Hab. BRITISH HONDURAS: Belize, in marshes (*Morelet* [1 2]).

Var. *edentula*.

Planorbis cannarum, Morelet, loc. cit. p. 16 [3].

Planorbula dentiens, var. *edentula*, Fisch. & Crosse, loc. cit. pp. 80, 81, t. 34. figg. 6, 6 *a–c* [4].

Hab. BRITISH HONDURAS: Belize, in marshes (*Morelet* [3 4]).

Doubtful Species of Planorbis.

S. Clessin, in his Monograph of this genus [Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, Limnæiden (1878)], describes and figures several species which he had received from A. Morelet's collection, merely giving "? Central America" or no indication of locality at all; but as Morelet also collected in Cuba, and in the neighbouring Isla de Pinos, and Clessin himself included Cuba in his term "Central America," these species cannot be admitted here without further confirmation. Those which I have been able to identify satisfactorily with known Central-American forms are mentioned in the preceding pages; the rest will be briefly mentioned here, as it is just possible that they have been found within our limits.

Planorbis colon, Clessin, loc. cit. p. 209, t. 32. fig. 3: diam. 20, alt. 5·5 millim.; whorls 5–6. This species approaches the rather compressed forms of *P. caribæus*, but it has the left side deeply concave and apparently without an angular line even in the first-formed whorls.

Planorbis paucispiratus, Clessin, loc. cit. p. 223, t. 33. fig. 8: diam. 14, alt. 7 millim.; with 3 rapidly increasing whorls (given by A. Morelet). In Dunker's collection, which was at the disposal of Clessin when he worked at his Monograph, there is

a shell, labelled "Guatemala (*A. Morelet, H. Cuming*)," which agrees very well with the above-quoted description and figure; it closely resembles *P. wyldi*. The measurements given by Clessin in the description, 14 and 7 millim., are exactly those of his lower figure; but this is magnified to $\frac{3}{2}$, according to the line which indicates the natural size.

Planorbis edentulus, Clessin, loc. cit. p. 220, t. 33. fig. 2: diam. 6·5, alt. 1·5 millim.; whorls 4. This species is said to belong to the group of *P. armigerus*, *i. e.* to *Planorbulina*, but to be without internal lamellæ. It differs from *P. dentiens*, var. *edentula*, F. & Cr., in the number of whorls, and from *P. obstructus* (which agrees in this respect with Clessin's species) in the absence of internal lamellæ; but neither Fischer and Crosse nor I have seen full-grown specimens of the latter without internal lamellæ.—"Central America."

Planorbis circularis, Clessin, loc. cit. p. 221, t. 33. fig. 3: diam. 7, alt. 2 millim. This species agrees in most respects with *P. petenensis*, Morelet; but differs from it in the more arcuate right and left margins of the aperture, which render its form nearly circular. The number of whorls is stated to be 6 in the text, but on the figure 4 only are to be seen. The specimen in Clessin's collection is marked "Antillen," and its whorls are somewhat more gradually increasing.—"? Central America."

Planorbis strictus, Clessin, loc. cit. p. 223, t. 33. fig. 4: diam. 6, alt. 1·7 millim.; whorls 4. This form agrees very well with specimens of *P. stagnicola*, Morelet, from Cuba, given by J. Gundlach to the Berlin Museum.—"? Central America."

Planorbis solidulus, Clessin, loc. cit. p. 224, t. 33. fig. 10: diam. 12, alt. 3·5 millim.; whorls 5. The specimens of this species in Clessin's collection, kindly communicated by the author, are characterized by a very distinct turning to the left of the last whorl near the aperture (underside), in which respect it resembles *P. pronus* and *P. subpronus*; but in the original description and figures this character is not noticed.—Locality unknown.

Planorbis mexicanus (Philippi), Dunker, in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, Limnæaceen, t. 12. figg. 1–3 (sine descr.). Perhaps a very young specimen of *P. caribæus*.—Mexico.

ANCYLUS.

Ancylus, Geoffroy, Traité Coq. Terr. et Fluv. de Paris, p. 122 (1767); O. Fr. Müller, Hist. Verm. ii. p. 159, &c.

Shell simply conical, without spiral whorls; apex pointed, recurved backwards, usually somewhat asymmetrical; aperture occupying the whole length and breadth of the shell.

Feelers short, blunt.

Geographical distribution universal; comparatively more numerous in species in North America than elsewhere.

COMPARATIVE TABLE OF THE SPECIES OF *ANCYLUS*.

Nomen.	Figura.	Sculptura.	Apex.	Long.	Lat.	Alt.	Patria.
				mm.	mm.	mm.	
sallei, *Bourg.*	elliptica, obtuse conica.	radiatim costulata.	obtusus, in $\frac{3}{5}$–$\frac{3}{4}$ long., paulum dextrorsus.	$3\frac{2}{3}$–5	2	$1\frac{1}{2}$	E. Mexico.
papillaris, *v. Mart.*.	elliptica vel subovalis, depresse conica.	microscopice radiatim striatula.	obtusus, in $\frac{4}{5}$ long., dextrorsus.	4–5	3	$1\frac{1}{2}$	N.W. Mexico.
excentricus, *Morel.*.	ovato-oblonga, depresse conica.	lævis.	acutiusculus, in $\frac{2}{3}$–$\frac{3}{4}$ long., dextrorsus.	7	$4\frac{1}{2}$	?	Yucatan, N. Guatemala, E. Nicaragua.
——, var. biolleyi, *v. Mart.*	ovato-oblonga, depresse conica, postice compressa.	„	acutus, in $\frac{4}{5}$ long., dextrorsus.	5–$5\frac{1}{2}$	3	2	Centr. Costa Rica.
——, var. pittieri, *v. Mart.*	ovato-oblonga, depresse conica, postice rotundata.	„	obtusiusculus, in $\frac{2}{3}$ long., dextrorsus.	$4\frac{1}{2}$	3	$1\frac{1}{2}$	S.W. Costa Rica.

1. Ancylus sallei.

Ancylus sallei, Bourguignat, Aménités Malac. ii. p. 32 (Rev. et Mag. Zool. 1857, p. 16)[1]; Spicilegia Malac. p. 231[2]; Binney, Land and Freshw. Moll. N. Am. ii. p. 142[3]; Strebel, Beitr. Mex. Land- und Süssw.-Conch. i. p. 63, t. 4. fig. 35[4]; Fisch. & Crosse, Miss. Scient. Mex., Mollusca, ii. p. 38, t. 30. figg. 17, 17 *a, b*[5]; Clessin, in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, Ancylinen, p. 25, t. 6. fig. 9 (copied from Strebel)[6].

Radiately striate and with a few concentric ridges; apex very blunt, at about $\frac{3}{4}$ or $\frac{3}{5}$ of the length, somewhat to the right.

Long. 5, lat. 2 (3?), alt. $1\frac{1}{2}$ millim. (Bourguignat).
„ $3\frac{2}{3}$, „ $2\frac{1}{2}$, „ $1\frac{1}{2}$ „ (Strebel).

Hab. E. MEXICO: Laguna larga de Toxpan, near Cordova, on pieces of rotten wood (*Sallé*[1 2 3 5]); Vera Cruz, within the shell of an *Ampullaria* (*Strebel*[4 6]).

It is not quite certain that the shells obtained by Sallé and Strebel belong to one and the same species, as the measurements given by the French and German authors do not accord; moreover, the apex in Fischer and Crosse's figure[5] is placed at three-fourths of the length, and in that of Strebel[4] at three-fifths of the length. Bourguignat's measurement of the breadth, however, does not agree with Fischer and Crosse's figure, as in the latter the breadth is somewhat more than half the length, about $\frac{3}{5}$ and not $\frac{2}{5}$ of it. Strebel[4], in his description of the shell, uses the terms "before" and "left" in a contrary sense, these portions, in regard to the position of the animal, being really "behind" and "right."

According to Bourguignat, *A. sallei* is also found in Cuba.

2. **Ancylus papillaris,** sp. n. (Tab. XXI. figg. 11, 11 *a*, 12, 12 *a*.)

Testa elliptica vel subovalis, depresse conica, microscopice striatula, tenuis, pallide cornea, subdiaphana, vertice valde obtuso, sulculo circumscripto, dextrorso, in $\frac{4}{5}$ longitudinis testæ posito.

a. Long. 5·2, lat. 3·5, alt. 1·6 millim. (fig. 12).
b. „ 4·4, „ 2·9, „ 1·4 „ (fig. 11).

Hab. N.W. Mexico: Rio Ameca, State of Jalisco (*Richardson*, Dec. 1884).

This species belongs to the same subdivision of *Ancylus* as *A. excentricus*, which is characterized by having the summit of the shell turned to the right [not to the left, as in *Ancylus* (*Velletia*) *lacustris*, L.], this subdivision including also some Antillean and South-African forms. It varies somewhat in the outlines of the base, being either more narrowly elliptical (fig. 12) or more broadly oval (fig. 11); the radiating striæ are very fine and not easily seen, and in some specimens they are present on the inner side only. The summit is very obtuse and limited by one or even two concentric furrows from the other part of the shell, somewhat as in *Sphærium calyculatum*, Drap.

3. **Ancylus excentricus.**

Ancylus excentricus, Morelet, Test. Noviss. ii. p. 17 (1851) [1]; Fisch. & Crosse, Miss. Scient. Mex., Mollusca, ii. p. 37, t. 30. figg. 16, 16 *a* [2]; Pilsbry, Proc. Acad. Phil. 1891, p. 3 [3].
Velletia excentrica, Tate, Amer. Journ. Conch. v. p. 158 [4].

Without radial sculpture, flat, attenuated in front; apex pointed, in nearly $\frac{3}{4}$ of the length, much inclined to the right. Length 7, breadth $4\frac{1}{2}$ millim.

Hab. Yucatan: Shkolak (*Heilprin* [3]).
N. Guatemala: Lago de Itza, Peten (*Morelet* [1 2]).
E. Nicaragua: San Nicolas and San Agustin, district of Chontales, in pools and streams, on aquatic plants (*Tate* [4]).
According to Pilsbry [3], occurs also in Texas.

Fischer and Crosse [2] state that the apex is $\frac{2}{3}$ of the length, but in their figure it is nearly $\frac{3}{4}$.

Var. *biolleyi*, n.

Distinct from typical *A. excentricus* by being more elevated and compressed in its hinder part, and comparatively a little narrower. Length 5–$5\frac{1}{2}$, breadth 3, height 2 millim.; apex in $\frac{9}{11}$–$\frac{4}{5}$ of the length. Pale horn-coloured.

Hab. Central Costa Rica: Rio Torres, on stones, and at San José, in irrigating-tubes (*Biolley*, 1891).

Var. *pittieri*, n.

Very flat, broadly rounded behind; apex depressed, somewhat blunt, in $\frac{2}{3}$ of the length of the shell. More or less dark horn-coloured, in some specimens nearly black. Length $4\frac{1}{2}$, breadth 3, height $1\frac{1}{2}$ millim.

Hab. S.W. Costa Rica: Ignacio, near San Domingo, and Rio de Los Platanales at the Golfo Dulce (*Pittier*).

The two Costa Rican forms appear to be sufficiently distinct from one another to be regarded as distinct species; but the typical *A. excentricus* from Guatemala, according to Fischer and Crosse's description and figure, seems to be intermediate between them, in regard to the relation of the breadth to the length of the shell and to the position of the apex.

Obs.—*A. culicoides*, d'Orb. Mag. Zool. 1835, Classe V. no. 61, p. 23; Voy. Am. mér., Moll. p. 355, t. 42. figg. 9–12, from Guayaquil, Ecuador, is very near *A. excentricus*: according to the figure, it appears to have a blunter summit to the shell.

Dr. O. Stoll has also found some specimens of *Ancylus* in Central Guatemala, in small streams near the capital, and in West Guatemala, in wells at Retalhuleu; but as they are not available at the present moment for examination, it is impossible to identify them.

GUNDLACHIA.

Gundlachia, Pfeiffer, Zeitschr. f. Malak. 1849, p. 97; H. & A. Adams, Gen. Moll. ii. p. 267.

Shell resembling that of *Ancylus*, but with the apex prolonged backwards into a cylindrical tube, exceeding considerably the hinder margin of the aperture, and the inside provided with a horizontal septum, like that of the marine genus *Crepidula*—comparatively very large in the young shell, more reduced in the full-grown one. Median tooth of the radula bicuspid; laterals multicuspid.

Several species in the Antillean islands, one in California, one in Honduras, and one in Tasmania.

1. Gundlachia hjalmarsoni.

Gundlachia hjalmarsoni, Pfr. Malak. Blätt. v. p. 197 (1858) [1].

Oval-oblong, with fine radial lines, pale horn-coloured; apex rounded; the basal septum occupying ½ of the whole length, its anterior edge concavely arched, basal margin before and behind somewhat elevated. Length 4, diam. scarcely 2, height 1½ millim.

Hab. HONDURAS: Santa Rosa (*Hjalmarson*, 1852–53 [1]).

GASTROPODA PROSOBRANCHIA *.

AMPULLARIA.

Ampullaria, Lamarck, Mém. Soc. d'Hist. Nat. 1799, p. 76; Hist. Nat. des Anim. sans Vert. ed. 1, vi. 2, p. 176; ed. 2, viii. p. 527; Philippi, in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, i. no. 20 (1851); Reeve, Conch. Icon. x. (1858); Fischer & Crosse, Miss. Scient. Mex., Mollusca, ii. p. 223.

Shell more or less globose, with green or brown periostracum, spire short, last whorl rounded, swollen; umbilicus in most of the species open; aperture longer (higher) than broad, acutangular above, rounded beneath. Operculum concentrical, in all American species horny.

A pair of very long, filiform, tapering feelers, the eyes on distinct prominences at their base externally; a second pair of shorter conical feelers in front of the projecting muzzle. On the left side a long feeler-like tube, leading the water to the gills (except in the subgenus *Asolene*). Close to the gill-cavity a distinct compartment adapted for air-breathing. This last-mentioned structure enables the animal to retain its vitality for months or even years in a dry state, which is very useful to it in the dry season, if the ponds are dried up †.

Eggs round, with calcareous brightly-coloured shell, rose, scarlet, or green, deposited in clusters on aquatic plants.

For further systematic and anatomical particulars, see Fischer and Crosse, *loc. cit.*

Very young shells of various American species show spiral lines of fine hairs or scales; they are distinctly visible in the young shells collected at Vera Cruz by H. H. Smith (see Tab. XXII. fig. 11 *a*), which belong without doubt to *A. flagellata*, Say; Fischer and Crosse mention a similar character in *A. belizensis*.

Geographical distribution circumtropical, being represented in Tropical Africa, in India, the Malay Archipelago as far east as the island of Celebes, and extending in America from Georgia, Florida, and Eastern Mexico (Papantla) to Argentina. They are wanting, however, in the central parts of Mexico, Guatemala, and Costa Rica. Tate's note on the habits of *A.* (*Pomus*) *pyrum* (=*hondurasensis*, Reeve)—on the muddy bottom of still water, but also sometimes observed floating—is probably applicable to all the Mexican and Central-American species.

In 1858 I tried to arrange the numerous American species in several groups, according to the general shape and aspect of the shell (Malakozoologische Blätter, iv.

* As most of the genera here treated belong to a separate family, I prefer to characterize the genera only in this work.

† There are recorded instances of specimens having been preserved for several years in collections, and then reviving when placed in lukewarm water, but they always died soon afterwards.

pp. 187–200); these groups, however, are connected by intermediate forms, and several of them are confined to the more southern parts of America. In Mexico and Central America four groups are represented, in addition to the subgenus *Ceratodes*; they are as follows:—

I. Cassidiformes. Shell ovate, whorls equally rounded, with flat (superficial) sutures. Interior of the aperture often deeply coloured.
II. Doliiformes. Shell globose, last whorl very swollen, sutures deeper.
III. Heliciformes. Shell smaller, depressed-globose, with elevated spire and moderate umbilicus.
IV. Patulæ. Shell smaller, more or less ovate, more enlarged beneath; sutures rather deep; umbilicus narrow or closed.

	I.	II.	III.	IV.
E. Mexico	*flagellata*, with vars. *exsculpta*, *arata*, and *melanostoma*; *strebeli*, with var. *prasina*.			
S.E. Mexico.....	*flagellata*, with vars. *exsculpta*, *arata*, *chiapasensis*, and *malleata*.	*ghiesbreghti*, with var. *miltochilus*.	*cerasum*.	
S. Centr. Mexico..	*flagellata*, var. *oajacensis*, *innexa*.			
W. Mexico	*violacea*.			
S.W. Mexico	*eumicra*, *innexa*.			
S. Mexico	*monachus*.	.....	*erogata*.	
Yucatan	*flagellata*, var. *arata*.	*ghiesbreghti*, var., *yucatanensis*.		
British Honduras .	.....	*belizensis*, *ghiesbreghti*, var. *lemniscata*.		
N. Guatemala ..	*flagellata*, vars. *gigantea*, *tristrami*, and *guatemalensis*.	*delattrei*.	*erogata*.	
W. Guatemala ..	*flagellata*, var. *guatemalensis*, *occlusa*.			
E. Guatemala	.....	*delattrei*, *yucatanensis*, var. *yzabalensis*.		
Honduras	*auriformis*, *dysoni*.	? *hondurasensis*.		
Nicaragua	.....	*costaricana*, *hondurasensis*.		
Costa Rica	*flagellata*, var. *arata*.	*costaricana*.	....	*conoidea*.
N. Panama	.....	*costaricana*.	....	*pealeana*, *cumingi*.
S. Panama	.....	.....	....	*cumingi*.

AMPULLARIA, sensu strictiore.

I. CASSIDIFORMES.

1. **Ampullaria flagellata.** (Tab. XXIII. figg. 1, 4, 4 *a*, *b*.)

Ampullaria flagellata, Say, in New Harmony Disseminator of Useful Knowledge, ii. p. 260 (descriptions, p. 22) (1827)[1]; ed. Binney, p. 147[2]; Hald. Monogr. Limniades, viii. p. 10[3]; Binney, Land and Freshw. Shells N. Am. iii. p. 7[4]; Strebel, Beitr. Mex. Land- und Süssw.-Conch. i. p. 26, t. 3. fig. 14, t. 3 *a*. figg. 14, 14 *a–k*, 15[5]; Fisch. & Crosse, Miss. Scient. Mex., Mollusca, ii. p. 239[6]; Pilsbry, Proc. Acad. Phil. 1891, p. 325[7].

Ampullaria ochracea, Jay, Catalogue of Shells, 1839, p. 116, t. 3. fig. 8[8].

Comparative Table of the Species of *Ampullaria*.

Nomen.	Forma.	Sculptura.	Coloratio.	Peristoma.	Long.	Diam.	Aperturæ.		Patria.
							Long.	Diam.	
Ampullaria, s. str. flagellata, *Say*	ovata, obtusispira, sutura plana, umb. angusto.	sparsim malleata, nitida.	pallide olivacea, basi obscurior.	magis reflexum, flavidum.	mm. 43–63½	mm. 36–56	mm. 29–44	mm. 22–32	E. & S.E. Mexico.
——, var. exsculpta, *F. & Cr.*	,,	valide et crebre malleata.	,,	,,	53	44	37	25	E. Mexico.
——, var. arata, *F. & Cr.*	,,	verticaliter subplicata.	,,	,,	37–55	31–48½	27½–38½	22–24½	E. Mexico, Yucatan, Costa Rica.
——, var. chiapasensis, *F. & Cr.*	ovata, spira magis acuta, umbilico latiore.	valide malleata.	brunnea.	subsimplex, albidum.	55	43	37	24	S.E. Mexico.
——, var. oajacensis, *F. & Cr.*	oblongo-ovata, spira magis acuta, umb. angusto.	verticaliter striata.	pallide brunnea.	reflexum, aurantium.	47	36	31	22	S. Centr. Mexico.
——, var. melanostoma, *Phil.*	ovata, obtusispira, sutura plana, umb. angusto.	parum malleata, nitida.	pallide flavescenti-grisea, ad suturam pallida.	subreflexum, pallidum.	39–42	36–37	28–30	19–21	E. Mexico.
——, var. malleata, *Jonas.*	ovata, spira sat acuta.	crebre reticulatim malleata, nitida.	flavido-olivacea.	subreflexum, flavescens, fusco-limbatum.	77–80	65–66	52–54	32–33	S.E. Mexico.
——, var. gigantea, *Tristr.*	globoso-ovata, spira sat acuta.	,,	,,	,,	91–95	86–90	66–69	39–44	N. Guatemala.
——, var. tristrami, *F. & Cr.*	latiuscule ovata, sut. plana.	verticaliter striata, parum malleata, nitida.	flavido-olivacea, ad suturam pallidior.	,,	63–64	55–58	45–47	30–33	N. Guatemala.
——, var. guatemalensis, *v. Mart.*	late ovata, spira sat acuta, sutura profundiore, umb. latiore.	parum malleata.	obscure fusca.	anguste reflexum.	56–91	48–78	39–63½	25–42½	N. & W. Guatemala.
violacea, *Val.*	ovato-globosa, deorsum valde angustata, spira mediocri, acuta, sut. paulum profundiore.	verticaliter striatula, raro malleata.	pallide virescens.	simplex, albidum.	42–43	37½–38	30	21	W. Mexico.

strebeli, *F. & Cr.*	ovato-globosa, sutura profunda, spira conica, acuta, umb. angusto.	verticaliter striata et lineis nonnullis spir. angularibus.	obscure fusca, nitida, ad sut. pallidior.	simplex, tenue, albidum.	40–52	36–42	29–34	19–24	E. Mexico.
——, var. prasina, *F. & Cr.*	,,	,,	obscure viridis, multifasciata, nitida.	simplex, tenue, flavidum.	50	40	34	24	E. Mexico.
innexa, *Cr. & F.*	subglobosa, spira longiore, acuta, umb. angusto.	verticaliter striatula.	violaceo-fusca, multifasciata.	simplex, tenue, pallidum.	39	32	26	18	S. Centr. & S.W. Mexico.
eumicra, *Cr. & F.*	ovato-globosa, deorsum valde angustata, sut. subplana, umb. angusto.	,,	pallide viridis, multifasciata.	subreflexiusculum, flavescens.	39	27	22	15	S.W. Mexico.
monachus, *Cr. & F.*	globoso-ovata, spira mediocri, sut. parum profunda.	,,	viridi-fusca.	simplex, tenue, pallide flavidum.	45	38	31	22	S. Mexico.
occlusa, *Cr. & F.*	ovata, brevispira, sut. modica, umb. fere clauso.	vertical. striata, paulum malleata.	obscure viridis, multifasciata.	simplex, flavidum.	50	41	38	24	W. Guatemala.
auriformis, *Reeve*	anguste ovata, superne angulata.	vertical. striata et malleata.	griseo-olivacea, unicolor.	basi subexpansum, cærulescens.	60	49	46	30	Honduras.
dysoni, *Hanl.*	globoso-conoidea, spira longiore, acuta, sut. plana, umb. lato.	vertical. striata.	rufo-fusca, unicolor.	simplex, purpurascens.	56	52	35	27	Honduras.
belizensis, *Cr. & F.*	ovato-globosa, spira obtusa, sut. sat profunda, umb. latiusculo.	,,	rufo-fusca, multifasciata.	crassiusculum, simplex, flavescens.	63	55	65	28	Brit. Honduras.
ghiesbreghti, *Reeve*	globosa, spira exserta, acuta, sutur. prof., umb. latiusculo.	vertical. striata, spiratim tenerrime striatula.	castanea, unicolor.	simplex, rubrum vel aurantium.	70–85	63–70	52–60	38–43	S.E. Mexico.
——, var. miltochilus, *Reeve.*	globosa, brevispira, sut. modice profunda, umb. lato.	corrugata et malleata.	virescens, multifasciata.	rubrum, expansum, subincrassatum.	48	43	35	25	S.E. Mexico.
——, var. lemniscata, *Cr. & F.*	globosa, obtusispira, sut. modice profunda, umb. sat angusto.	vertical. striata.	cinereo-virescens, multifasciata.	late reflexum, crassiusculum, aurantium.	43	39	33	23	Brit. Honduras.
costaricana, *v. Mart.*	globosa, umb. latiusculo.	vertical. inæqualiter striata.	cinereo-virescens, multifasciata vel fusca.	simplex, pallidum, fasciolatum.	40–46	37–44	30–35½	19–22	Nicaragua, N.W. & S.W. Costa Rica, N. Panama.

COMPARATIVE TABLE OF THE SPECIES OF *AMPULLARIA* (*continued*).

Nomen.	Forma.	Sculptura.	Coloratio.	Peristoma.	Long.	Diam.	Aperturæ.		Patria.
							Long.	Diam.	
delattrei, *Reeve*	globosa, spira brevi, conica, sutur. sat profunda, umb. perangusto.	vertical. striata (sparsim rugoso-malleata).	virescenti-flava, viridi-fasciata.	subreflexum, flavum, fusco-limbatum.	mm. 38–49	mm. 36½–45	mm. 27–32	mm. 20–24	N. & E. Guatemala.
yucatanensis, *Cr. & F.*	globosa, spira brevi, acuta, sut. subplana, umb. perangusto.	verticaliter striatula, sparsim malleata.	viridis vel fusca, nitida.	tenue, simplex, albidum.	32–50	29–45	25–40	17–27	Yucatan.
——, var. yzabalensis, *v. Mart.*	globosa, spira mediocri, acuta, sutura subplana, umb. pæne clauso.	,,	,,	,,	44	39	33	22	E. Guatemala.
hondurasensis, *Reeve*	globosa, spira brevi, obtusa, sut. profunda, umb. clauso.	verticaliter plicatulo-striata.	olivacea, nitidula.	sublabiatum, rectum, albidum.	38	33½	30	20	? Honduras, Centr. Nicaragua.
cerasum, *Hanl.*	globosa, spira conica, sut. profunda, umb. latiusculo.	vertical. inæqualiter striata.	castanea vel subolivacea.	crassiusculum, rubrum.	20–37	19–32	16½–27½	11–17	S.E. Mexico.
erogata, *Cr. & F.*	globosa vel ovato-globosa, umb. angusto.	verticaliter striatula, raro malleata.	fusco-virescens.	pallide rufescens.	32	26	22	16	S. Mexico, N. Guatemala.
cumingi, *P. King*	globosa, spira conica, sut. profunda, umb. sat angusto.	vertical. striata.	pallide fusca, fasciata.	subexpansum, albidum, fasciatum.	20–42	19½–36	14–31	10–26½	N. & S. Panama.
conoidea, *v. Mart.*	globoso-conoidea, spira elata, sut. profunda.	vertical. plicato-striata, spir. subtilissime lineata.	pallide fulva, fasciata.	leviter expansum, album.	25–30	21½–24	17–19	13–14	Costa Rica.
pealeana, *Lea*	globoso-conoidea, spira conica, sut. minus profunda, umb. clauso.	sublævis.	fulva, fasciata.	simplex, album.	35–39	30–35	24–31	18½–20	N. Panama, Colombia.
Subgen. CERATODES.									
rotula, *Mouss.*	obese discoidea, supra modice, infra valde concava.	vertical. striata.	fusco-olivacea, fasciata.	simplex, albidum, fasciatum.	14–29	23–40	11–22	9–15	Costa Rica, Colombia.

Ampullaria malleata (Jonas), v. Mart. in Malak. Blätt. iv. p. 189 (1858)[9]; Fisch. & Crosse, loc. cit. p. 334 (part.), t. 46. fig. 2[10].

Ampullaria reflexa (Swains.), varr., Philippi, in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, *Ampullaria*, pp. 35, 58, t. 9. fig. 6, and t. 18. fig. (without number, the middle one in the lower row, the latter copied from Jonas)[11].

Ampullaria flatilis, Reeve, Conch. Icon. x., *Ampullaria*, t. 7. fig. 31[12].

Ampullaria violacea (Val.), v. Mart. in Malak. Blätt. xii. p. 52 (1865)[13].

A very variable shell, chiefly distinguished by its ovate form, with rather obtuse spire and superficial suture, the smooth and somewhat shining surface, with more or less numerous malleated impressions, and the somewhat enlarged and expanded peristome, this being especially noticeable in the lower half of its outer side. It is generally of a yellowish-green (olivaceous) colour, more or less pale, somewhat darker in the lower half of the shell; worn specimens become violet, as in most species of this genus, and in fresh shells the upper whorls, having been exposed for a longer time to chemically destroying agencies, are often of a violet colour, the uppermost summit generally being blackish; the interior of the aperture is usually of a dark purple-brown, the peristome pale yellowish. The size is very variable, as in many species of freshwater shells. A distinctly expanded peristome does not always denote that the shell is full-grown, for specimens occur in which the remnant of an expanded peristome is to be seen about a half-whorl backwards of the aperture, as in the figure given by Jonas and in fig. 15 of Strebel.

a.	Long.	63½,	diam.	56;	apert. long.	44,	diam.	28	millim.
b.	„	60,	„	48;	„	40,	„	26	„
c.	„	58,	„	53½;	„	44,	„	32	„
d.	„	51,	„	47½;	„	41,	„	30	„
e.	„	53,	„	47;	„	38,	„	26	„
f.	„	43,	„	38½;	„	32½,	„	24	„
g.	„	43,	„	36;	„	29,	„	22	„

a. Dimensions of Strebel's specimen fig. 14, from Vera Cruz; *b*. Measurements of Jay's figure; *c–g*. Specimens from Cordova, collected by Höge.

Hab. E. Mexico: Vera Cruz[1 2 7 11] (*Haines, in coll. Dunker*; *Höge*; *H. H. Smith*); immediate environs of the town Vera Cruz, in the so-called Rio Tenoya, and in ditches which communicate with it (*Strebel*[5]); Cordova (*Höge*).

S.E. Mexico: Tabasco[12]; Balancan, State of Tabasco, in marshes (*Morelet*); Teapa, State of Tabasco (*H. H. Smith*).

Very young specimens of this species are figured on Tab. XXIII. figg. 4 *a*, *b*.

I restrict the name *flagellata* to the specimens from Eastern Mexico and to those essentially similar to them, a fine series of which has been collected by Herr Höge at Cordova; the dimensions given above under *c–g* are all taken from specimens with an expanded peristome, and therefore probably full-grown.

As regards the synonymy of this species, I may refer to the observations of Strebel[5], Fischer and Crosse, and Pilsbry[7]. Say does not mention the malleated impressions, but his name "*flagellata*" (lashed, scourged) can hardly be understood otherwise than as an allusion to them; the locality given by him[1] "near Vera Cruz" coincides well with the statements of subsequent writers, and, moreover, Pilsbry, having examined the type-specimens, asserts[7] the identity of *A. flagellata* and *A. malleata*. With regard to *A. reflexa*, Swainson (1823), the original figure of it, copied by Philippi (*loc. cit.* t. 3.

fig. 1), is very like some specimens collected by Herr Höge at Cordova; but as Swainson gives no locality, and Mousson has applied the same name to a species living in the Magdalena River (Malakozoologische Blätter, 1869, p. 182), and the original figure still more nearly resembles *A. porphyrostoma*, Reeve, as well as some Cuban specimens in the Berlin Museum, I dare not apply the name *reflexa*, Swainson, to the Mexican shell, although examples of the latter sometimes have a rather broadly expanded peristome. *A. labiosa*, Fr. Koch (Philippi, *loc. cit.* p. 58, t. 18. fig. 5), is also like some of the specimens from Cordova, and it may be founded on a small example of *A. flagellata* with unusually broadly expanded peristome.

Var. *exsculpta*. (Tab. XXIII. fig. 5.)

Ampullaria flagellata (part.), Strebel, loc. cit. t. 3. fig. 14[14].
Ampullaria malleata, var. δ. *exsculpta*, Fisch. & Crosse, loc. cit. p. 235, t. 44. figg. 6, 6 *a–c*[15].

With very numerous and rather strong malleated impressions, without bands; spire somewhat pointed. Long. 53, diam. 44; apert. long. 37, diam. 25 millim.

Hab. E. Mexico: Vera Cruz (*Strebel*); Cordova (*Höge*).

Var. *arata*. (Tab. XXIII. figg. 7, 8, 10.)

Ampullaria flagellata, vars. 2 & 6, Strebel, loc. cit. pp. 27, 31, t. 3. fig. 14 *d*, and t. 3 *a*. fig. 14 *k*[16].
Ampullaria malleata, var. ε. *arata*, Fisch. & Crosse, loc. cit. p. 235, t. 44. figg. 6 *d*, *e*[17].

Distinct vertical elevated striæ occupying the greater part of the surface; very few or no malleated impressions.

Long. 43, diam. 38; apert. long. 36, diam. 22 millim. (specimen from Yucatan in the late Albers's collection).

Hab. E. Mexico: Vera Cruz and adjacent village of Vergara (*Strebel*[16]); Cordova (*Höge*).

Yucatan (*coll. Albers*).

Fischer and Crosse[15 17] give the localities combined for the varieties *exsculpta* and *arata*:—

E. Mexico: Laguna de Los Cocos, State of Vera Cruz (*Sallé*).

S.E. Mexico: Balancan, State of Tabasco, in the marshes of the river Usumacinta (*Morelet*).

Yucatan: Palizada and San Gerónimo, in marshes (*Morelet*).

It seems therefore probable that specimens exhibiting these divergencies in sculpture may be found at different localities throughout the geographical range of the species.

From Costa Rica I have received from P. Biolley and Van Patten several examples of an *Ampullaria* which I cannot distinguish from the var. *arata*, including some from the "Laguna de Bebedero, Pacific coast," of rather small size, from P. Biolley, as well as others of larger size (Tab. XXIII. fig. 10).

The shell figured (Tab. XXIII. fig. 8) from Cordova, collected by Herr Höge, shows an evident transition from the var. *arata* to the var. *exsculpta*, the upper whorls and

the first half of the last being sculptured as in *arata*, the second half of the last as in *exsculpta*. These two so-called varieties seem to be individual variations of exaggerated sculpture rather than local forms.

Var. *chiapasensis*.

Ampullaria malleata, var. *γ. chiapasensis*, Fisch. & Crosse, loc. cit. p. 235, t. 48. fig. 5 [18].

Small, with more pointed conical spire and moderately large umbilicus.
Long. 55, diam. 43; apert. long. 37, diam. 24 millim.

Hab. S.E. Mexico: Las Playas, State of Chiapas, in marshes (*Morelet* [18]).

This form has a somewhat different appearance from the typical *A. flagellata*, and I should not treat it as a variety of that species if Fischer and Crosse had not done so.

Var. *oajacensis*.

Ampullaria malleata, var. *ζ. oajacensis*, Fisch. & Crosse, loc. cit. p. 235, t. 46. figg. 3, 3 *a*, *b* [19].

Small, narrowly umbilicated and rather sharply pointed, with numerous inconspicuous pale bands; peristome orange.
Long. 47, diam. 36; apert. long. 31, diam. 22 millim.

Hab. S. Central Mexico: Monte de Mistam near Coapam, State of Oaxaca (*Sallé* [19]).

Very near the preceding, save the longer spire; it is also somewhat like the specimens of *A. flagellata* from Cordova.

The shell figured by Philippi (*loc. cit.* p. 36, t. 9. fig. 7) under the name *A. flagellata*, Say, found by Liebmann in Mexico, without nearer indication of locality, comes very near this variety, only it is a little more globose and its peristome white, whereas it is orange-yellow in Fischer and Crosse's figure.

Var. *melanostoma*. (Tab. XXII. fig. 7.)

Ampullaria reflexa, var. *melanostoma* (Parr.), Philippi, loc. cit. pp. 35, 58, t. 18. fig. 4 (1851) [20].
Ampullaria livescens, Reeve, Conch. Icon. x., *Ampullaria*, t. 5. fig. 21 (1856) [21].
Ampullaria flagellata, var. 1, Strebel, loc. cit. p. 27, t. 3 *a*. fig. 14 E [22].

Shining, greenish-yellow, with very short blunt spire, and the aperture rather dark inside.
a. Long. 40, diam. 36; apert. long. 28, diam. 19 millim.
b. „ 42, „ 37; „ 32, „ 21 „
c. „ 39, „ 37; „ 30, „ 20 „
a. Dimensions of a specimen from Amatlan; *b*. From Philippi's figure; *c*. Specimen from Papantla.

Hab. E. Mexico: Papantla and in a freshwater lagoon between Amatlan and Cosamaloapan (*Deppe, in Mus. Berol.*); Vera Cruz (*Strebel* [22]).

Var. *malleata*. (Tab. XXII. fig. 10.)

Ampullaria malleata, Jonas, in Zeitschr. für Malak. 1844, p. 35 [23]; Abhandl. Ges. f. Naturw. Hamb. i. p. 122, t. 10. figg. 11, 11 *a*, *b* (1846) [24]; Reeve, Conch. Icon. x., *Ampullaria*, t. 7. fig. 32 [25].

Very large, oval, with numerous malleated impressions, giving the shell a reticulated appearance; interior of

the shell pale violet or reddish, with a blackish stripe behind the dextral margin of the aperture; peristome scarcely expanded in its lower half.

Long. 77, diam. 65; apert. long. 54, diam. 32 millim.

Hab. S.E. Mexico: Tabasco (*Fokkes* [23 24]).

I give here a figure of a specimen in the late Dunker's collection which nearly agrees in size and shape with Jonas's original figure, and differs only in the pale reddish colour of the interior of the aperture. An example of the same form was also obtained in Tabasco by Captain Fokkes, and given by Dr. Jonas to Prof. Dunker. It is even possible that the first-mentioned specimen may be the type of Jonas's description, the dark colour of the inside of the shell in his figure being perhaps due to the circumstance that the draughtsman held the shell so that the visible part of the inside was mostly in deep shadow, and only the part next the margin in the light; if viewed in this manner, our specimen fully agrees with the figure. In the text the inside of the aperture is said to be of a beautiful violet, whereas in the figure it is blackish-blue.

Fischer and Crosse's large-sized specimen from Tabasco (*loc. cit.* t. 45. fig. 1 and t. 46. fig. 1) differs from the var. *malleata* in being remarkably more broad, especially in the last whorl, with deeper suture and without malleated impressions; the outside of a darker brown colour, with some narrow bands in the lower half of the whorl. It is doubtful if this example really belongs to the same species. Not having seen Morelet's specimens from Balancan in Tabasco, this locality cannot be quoted for any of the varieties of *A. flagellata*.

Var. *gigantea*. (Tab. XXIII. fig. 6.)

Pomus giganteus, Tristram, P. Z. S. 1863, p. 414 [26].

Very large and comparatively broader than the type of *A. flagellata*, var. *malleata*, but not otherwise differing from it.

Long. 91–95, diam. 86–90; apert. 66–69, diam. 39–44 millim.

Hab. N. Guatemala: Lake of Peten (*Salvin* [26]).

Through the kindness of Canon Tristram I have been enabled to examine and figure a specimen of this large form. The dimensions of the shell before me do not coincide with those given in his description, being respectively 91·86 for the whole shell, and 69·44 for the aperture, instead of 95·90 and 66·39, as indicated by him; it may therefore not be the actual example measured by him, though in all other respects the shell answers very well to the description. The complete malleated surface of the outside, the rather acute conical spire, the superficial suture, the pale green colour, passing on the spire into pale greyish-violet, with the apex itself somewhat dark brownish, the yellowish, scarcely expanded peristome, and the violet inside of the aperture, bordered towards the peristome by a much darker streak, are all suggestive of *A. malleata*, Jonas; but the specimen before me is somewhat more globose, the diameter being 0·94 of the length, and the breadth (diameter) of the aperture 0·64 of

the length of the aperture, instead of 0·84 and 0·59, as in the typical *A. malleata*. The measurements given by Canon Tristram himself, however, by the same reckoning are 0·94 for the whole shell as in the specimen examined by me, but 0·84 for the aperture.

Fischer and Crosse were probably misled by the words "anfractus ad suturam acute angulati" to think it a very different species, distinct by a sharp angular spiral line or keel near the suture; but the specimen now before me proves clearly that these words mean only that the outer wall of each whorl joins in an acute angle to the wall of the preceding whorl, the inner cavity of each whorl being acutangular above, which is characteristic of all forms of *A. flagellata*.

Var. *tristrami*. (Tab. XXII. figg. 1, 12.)

Pomus columbiensis, Tristram, P. Z. S. 1863, p. 414[27].

Ampullaria malleata, Fisch. & Crosse, loc. cit. p. 235, t. 46. fig. 2 (specimen from Cahabon)[28].

Ampullaria tristrami, Fisch. & Crosse, loc. cit. p. 234 (part.)[29].

Not quite so large as the var. *gigantea*, and comparatively a little broader, but with the superficial suture of the species; surface shining, with vertical striæ and very few slightly malleated impressions; yellowish-green, the vertical striæ somewhat paler, and therefore more conspicuous; a broad pale zone at the suture, well defined on the last whorl; some narrow spiral bands, two or three of which are usually placed near together, on the lower half of the last whorl. Peristome a little expanded below, yellow, with a chestnut-brown stripe inwards; interior of the aperture brownish-violet, paler towards the peristome.

Long. 64, diam. 58; apert. long. 47, diam. 33 millim.

Hab. N. Guatemala: Lake of Peten (*Salvin*[27 29]), Cahabon (*Sarg*[28]).

Salvin's original specimen now before me does not agree with Philippi's or Reeve's *A. columbiensis*, but is a variety of *A. flagellata*, nearly allied to the var. *gigantea*. Fischer and Crosse's figure of their Cahabon shell coincides so well in size, shape, and external colour with Salvin's specimen that I have no hesitation in referring it to the var. *tristrami*; only the interior of the aperture is conspicuously banded, as is often the case in not quite full-grown individuals, in which the last layer of the calcareous shell is still wanting.

They also give[28] Panzos and Lake Yzabal (*Bocourt*) as localities for *A. malleata*, but whether the specimens from these places really belong here I am unable to say.

There is some difficulty regarding the name of this variety. Fischer and Crosse not having seen Salvin's specimen, referred it to Reeve's *A. columbiensis* (1856); but as this name was preoccupied by Philippi (1851) they gave it a new one, copying, however, the description from Reeve. As their name clearly refers to Tristram's shell, and could not be applied to Reeve's *A. columbiensis* from Veraguas, it is best to adopt it.

Var. *guatemalensis*, n. (Tab. XXII. figg. 11, 11 *a*.)

Ampullaria malleata (Jonas), Fisch. & Crosse, loc. cit. p. 234 (part.), t. 45. fig. 1, t. 46. figg. 1, 2[30].

Somewhat broader, with more prominent, pointed spire and slightly deeper suture. Peristome generally more narrowly expanded. Size sometimes large. No or very few malleated impressions.

a. Long. 91, diam. 78; apert. long. 63½, diam. 42½ millim.
b. „ 74, „ 69; „ 54, „ 32 „

c. Long. 66, diam. 57½; apert. long. 47, diam. 30 millim.
d. „ 65, „ 56; „ 47, „ 28 „
e. „ 63, „ 55; „ 46, „ 30 „
f. „ 60, „ 55; „ 45, „ 29 „
g. „ 56, „ 48; „ 39, „ 25 „

a. Fischer and Crosse's figure 1; *c*, *f.* Specimens from Panzos; *d.* One of Stoll's specimens from Paso Antonio.

Hab. N. Guatemala: Panzos (*Bocourt* [30], *Conradt*); Cahabon (*Sarg* [30]).

W. Guatemala: Paso Antonio, in the lower part of the Rio Michatoya, near the Pacific coast (*Stoll*); Cerro Zunil (*Champion*).

This variety differs more in general appearance from the Mexican type than the preceding ones, and I should have treated it as a distinct species if intermediate forms had not been collected by Conradt at Panzos. In Fischer and Crosse's fig. 1 (t. 45) the aperture is comparatively more narrow, and the opposite side of the last whorl more bulky than in any of the specimens seen by myself: compared with fig. 1 of t. 46, which very probably represents the dorsal aspect of the same shell, it seems highly probable that the projection of the last whorl near the suture is due to a fault in drawing.

The colour is very variable. The specimens from North Guatemala (Panzos and Cahabon) are generally rather dark brown, with the bands inconspicuous outside the aperture, but very distinct within it. Most of those from Paso Antonio are greenish-grey, with inconspicuous bands, which are sometimes obsolete, the interior of the aperture very dark blackish-purple, and the outer margin in the full-grown shell yellow. One from the same locality, on the contrary, is on the outside unicolorous light yellow, with the interior of the aperture white and the outer margin of the peristome yellow; it may be regarded as a pale-coloured individual, approaching to albinism.

Another specimen from Paso Antonio has the upper whorls much eroded, looking as if filed off, and on the last two whorls several linear sharply cut scratches are visible, running either in the spiral direction or obliquely to it, these often being parallel and close to each other: they are quite distinct from the malleated impressions, not only in their linear form, but also in having the periostracum destroyed and the deeper layer of the shell denuded, whereas the malleated impressions are rounded and covered by the normal periostracum. This fact proves that the malleated impressions are formed during the natural growth of the shell, the scratches, on the contrary, being caused by later external injuries.

2. **Ampullaria violacea.** (Tab. XXII. fig. 3.)

Ampullaria violacea, Valenc. in Humboldt & Bonpland's Obs. Zool. ii. p. 259 (1833) [1]; Fisch. & Crosse, Miss. Scient. Mex., Mollusca, ii. p. 341, t. 46. figg. 4, 4*a* [2].

Ovate-globose, remarkably broad, the last whorl narrowing distinctly in the two lower thirds of its length (instead of being more convex in the median third as in *A. flagellata*). Suture rather superficial. Outside pale greenish, with narrow inconspicuous bands; inside the aperture pale brown, whitish only in

the upper part near the margin. Peristome expanded in full-grown examples. Surface smooth in some specimens, malleated in the largest.

a. Long. 43, diam. 38; apert. long. 30, diam. 21 millim.
b. „ 55, „ 49; „ 38, „ 24 „
c. „ 64, „ 57; „ 44, „ 29 „

a. Deppe's specimen; *b* and *c*. Specimens from Acapulco.

Hab. W. Mexico: in a freshwater lagoon (*Deppe, in Mus. Berol.*); Acapulco (*coll. Dunker*).

Valenciennes [1] gives only the vague term "New Spain" as locality. Fischer and Crosse [2] add Yucatan and Balancan in Tabasco (*Morelet*) and Vera Paz (*Bocourt*). The above-quoted figure is stated by them to have been drawn from Valenciennes's original specimen; it agrees very well in size and shape, and in the colour of the inside, with Deppe's rather worn example in the Berlin Museum. But Fischer and Crosse [2] give also two other figures, t. 46. fig. 8 and t. 48. fig. 6, which exhibit the general form of *A. flagellata*, and not the peculiar shape of the type of *A. violacea*; and as one of them, representing the living animal, has been drawn by Morelet himself, it is to be presumed that Morelet's specimens from Yucatan and Tabasco correspond to the two later figures, and cannot be safely referred to the typical *A. violacea*.

This species must remain somewhat doubtful until further examples are obtained; it was evidently described from a worn specimen, as no *Ampullaria* is violet outside in a fresh state, but nearly all have this colour if they have lost their periostracum (so-called epidermis).

Deppe's specimen is uniformly pale violaceous, manifestly worn, and shows very distinctly the inside of the aperture dull brown in its greatest part, but white above. Dunker's examples, one of which is here figured (Tab. XXII. fig. 3), are pale yellowish, somewhat greyish beneath, with narrow pale bands; apex dark violet; peristome broadly expanded; umbilicus cylindrical, moderately narrow: one of them is smooth, the other with a few malleations.

3. **Ampullaria strebeli.** (Tab. XXII. fig. 2.)

Ampullaria, sp. nov.?, Strebel, Beitr. Mex. Land- und Süssw.-Conch. i. p. 25, t. 3. fig. 13, t. 13 *a*. figg. 13 *a*, *b* [1].

Ampullaria malleata, var. *θ. strebeli*, Fisch. & Crosse, Miss. Scient. Mex., Mollusca, ii. p. 235 [2].

Suture much deeper than in *A. malleata*, the spire more pointed and conical, the lower part of the last whorl more narrowed; surface with vertical striæ of unequal strength and scattered irregular spiral angular lines, without malleated impressions, shining dark brown, with distinct spiral bands, which are sometimes obsolete, sutural region paler; interior of the aperture very dark brown; peristome whitish, thin, not expanded.

a. Long. 52, diam. 42; apert. long. 34, diam. 23 millim.
b. „ 43½, „ 37; „ 28, „ 19 „
c. „ 43, „ 36; „ 29, „ 19 „

Hab. E. Mexico: Misantla, in a small stream called the "Brazo seco" (*Strebel* [1 2]); Huatusco (*Dr. Hille, in coll. Dunker*).

Nearer *A. dysoni*, Hanley, than *A. malleata*, Fisch. & Crosse. I have seen one of Strebel's specimens.

Var. *prasina*.

Ampullaria malleata, var. *η. prasina*, Fisch. & Crosse, loc. cit. p. 235, t. 48. figg. 4, 4 *a* [3].

Shining dark green, with distinct bands, peristome yellowish.

Hab. E. Mexico: Misantla (*Fischer & Crosse* [3]).

Strebel (*loc. cit.* p. 26) gives the diameter of the aperture in his largest specimen (*a*) as 20 millim., but in his figure 13, taken from the same shell, it measures 23 millim. Fischer and Crosse [3] give for *A. prasina*, apert. long. 36, diam. 26 millim.; but on measuring their figure 4, I find the dimensions to be 34 and 24 respectively, although the length of the whole shell is 51 millim. in the figure and 50 in the description. I have corrected these measurements in the comparative table of the species (*anteà*, p. 407), because the original statements of the authors would imply a greater difference in form between *A. strebeli* and *A. prasina* than is proved by their figures.

4. **Ampullaria innexa.**

Ampullaria innexa, Crosse & Fisch. Journ. de Conch. xxxviii. p. 111 (1890) [1]; Miss. Scient. Mex., Mollusca, ii. p. 242, t. 44. figg. 7, 7 *a–c* [2].

Globose, but with rather produced conical spire; outer margin of the aperture much arcuated, thin, pale coloured.

Hab. S. Central Mexico: Monte de Mistam near Coapam, State of Oaxaca [2].
S.W. Mexico: on the Pacific shore, in the same State [1 2].

This form is rather near *A. strebeli*.

5. **Ampullaria eumicra.**

Ampullaria eumicra, Crosse & Fisch. Journ. de Conch. xxxviii. p. 113 (1890) [1]; Miss. Scient. Mex., Mollusca, ii. p. 243, t. 48. fig. 10 [2].

A small thin shell, resembling *A. flagellata*.

Hab. S.W. Mexico: State of Oaxaca (*Ghiesbreght* [2]).

Perhaps a young state or dwarf form of *A. violacea*, Val.

6. **Ampullaria monachus.**

Ampullaria monachus, Crosse & Fisch. Journ. de Conch. xxxviii. p. 112 (1890) [1]; Miss. Scient. Mex., Mollusca, ii. p. 250, t. 46. figg. 5, 5 *a* [2].

A somewhat broad, ovate form, with short spire, dark greenish-brown, with thin pale yellowish peristome.

Hab. S. Mexico: Santa Efigenia, on the Isthmus of Tehuantepec (*Sumichrast* [2]).

Resembles broad forms of *A. flagellata*.

7. **Ampullaria occlusa.**

Ampullaria occlusa, Crosse & Fisch. Journ. de Conch. xxxviii. p. 111 (1890) [1]; Miss. Scient. Mex., Mollusca, ii. p. 244, t. 45. figg. 3, 3 *a–c* [2].

Ovate, vertically striate and a little malleated, dark green, with numerous bands; umbilicus very narrow, but not closed; peristome simple, yellowish, interior of the aperture dark brown, paler above.
Long. 50, diam. 41; apert. long. 38, diam. 24 millim.

Hab. W. GUATEMALA: freshwater lagoon of Tanesco, on the Pacific coast, three leagues from the mouth of the River Guacalate (*Bocourt* [2]).

This seems to be another form very near *A. flagellata*, and I retain it as a separate species chiefly on account of its habitat. There are two specimens among the shells collected by Conradt in Guatemala, without nearer indication of locality, but probably from Panzos in the Polochic Valley, which much resemble the figure of *A. occlusa*, except that they are considerably smaller (long. 27, diam. 23 millim.), without doubt not full-grown.

8. **Ampullaria auriformis.**

Ampullaria auriformis, Reeve, Conch. Icon. x., *Ampullaria*, t. 28. fig. 133 (1856) [1].

A very distinct form, oblong, with an angular spiral line somewhat beneath the suture.
Long. 60, diam. 49; apert. long. 46, diam. 30 millim.

Hab. HONDURAS [1].

9. **Ampullaria dysoni.**

Ampullaria dysoni, Hanley, Conch. Misc., *Ampullaria*, t. 2. fig. 5 (1854–56) [1]; Reeve, Conch. Icon. x., *Ampullaria*, t. 11. fig. 49 [2].

Peculiarly broadly conoid, the aperture occupying scarcely more than $\frac{2}{3}$ of the whole length; spire conical, acute, with superficial sutures; umbilicus broad.
a. Long. 56, diam. 52; apert. long. 35, diam. 27 millim.
b. „ 69, „ 59; „ 49, „ 32 „
a. Figure given by Hanley; *b*. Figure given by Reeve.

Hab. HONDURAS (*Dyson* [1 2]).

II. DOLIIFORMES.

10. **Ampullaria belizensis.**

Ampullaria belizensis, Crosse & Fisch. Journ. de Conch. xxxviii. p. 110 (1890) [1]; Miss. Scient. Mex., Mollusca, ii. p. 231, t. 45. figg. 2, 2 *a–c*, t. 48. figg. 9, 9 *a* [2].

Intermediate in form between the ovate (Cassidiform) and the globose species, rather broadly umbilicated, reddish-brown, with numerous very distinct dark bands and a yellowish peristome. Very young specimens have minute epidermal scales placed in numerous spiral rows.

Hab. BRITISH HONDURAS: Belize (*Bocourt* [1 2]).

I have not seen a specimen of this species.

11. Ampullaria ghiesbreghti.

Ampullaria ghiesbrechtii, Reeve, Conch. Icon. x., *Ampullaria*, t. 26. fig. 123 (1856)[1].
Ampullaria ghiesbreghti, Fisch. & Crosse, Miss. Scient. Mex., Mollusca, ii. p. 233, t. 48. fig. 8[2];
Pilsbry, Proc. Acad. Phil. 1892, p. 338[3].

Large, globose, chestnut-brown, unicolorous, with rather large umbilicus and red or orange peristome.
a. Long. 85, diam. 70; apert. long. 60, diam. 43 millim.
b. „ 70, „ 63; „ 52, „ 38 „
a. Measurements of Reeve's figure; *b*. Of the figure given by Fischer and Crosse.

Hab. S.E. Mexico: Province of Chiapas (*Ghiesbreght*[1]); San Juan Bautista in Tabasco (*Prof. Rovirosa*[3]); Tenosique and in the marshes of the River Usumacinta (*Morelet*[2]).

Var. *miltochilus*.

Ampullaria miltocheilus, Reeve, Conch. Icon. x., *Ampullaria*, t. 25. fig. 120[4]; Fisch. & Crosse, loc. cit. p. 247[5].

Greenish, with numerous narrow bands, malleated; peristome bright red.
Long. 48, diam. 43; apert. long. 35, diam. 25 millim.

Hab. S.E. Mexico: Province of Chiapas (*Ghiesbreght*[5]).

Var. *lemniscata*.

Ampullaria lemniscata, Crosse & Fisch. Journ. de Conch. xxxviii. p. 112 (1890)[6]; Fisch. & Crosse, loc. cit. p. 248, t. 44. figg. 5, 5 *a*, *b*, *c*[7].

Pale greyish-green, with numerous narrow bands; peristome orange. Very near the preceding.
Long. 43, diam. 39; apert. long. 33, diam. 23 millim.

Hab. British Honduras: Belize (*Bocourt*[7]).

In Fischer and Crosse's figure of *A. lemniscata* the umbilicus does not appear to be narrower than that of *A. ghiesbreghti*, as stated. The aperture is comparatively of larger size, but this is usual in smaller specimens of the same species.

12. Ampullaria costaricana. (Tab. XXIV. figg. 14–17.)

? *Ampullaria reflexa* (Swains.), Reeve, Conch. Icon. x., *Ampullaria*, t. 15. fig. 69 (1856)[1].

Globose, solid, greyish-green with narrow brownish bands, or dark brown; surface with unequal rather faint vertical striæ; spire short, conical, with moderately deep sutures; if worn, blackish-violet; umbilicus moderately large, cylindrical; aperture with simple, sharp peristome, interior lead-coloured, distinctly banded, the bands prolonged into the external margin of the aperture.
a. Long. 46, diam. 44; apert. long. 35½, diam. 22 millim.
b. „ 44, „ 40; „ 35, „ 21 „
c. „ 43, „ 41; „ 35, „ 20 „
d. „ 40, „ 37; „ 30, „ 19 „
a and *b*. Specimens from Terraba; *c*. Specimen from Rio Saveyre; *d*. From Palmar.

Hab. Nicaragua: Lake of Nicaragua (*Biolley*).
N.W. Costa Rica: Rio Saveyre, at Boca Culebra (*Pittier*, 1898).

S.W. Costa Rica: Palmar, south of the Rio Grande de Terraba (*Cherrie*, ex *Pittier*).

N. Panama: Chiriqui (*Möschler, in coll. Dunker*).

Allied to *A. delattrei* and *A. ghiesbreghti*, but usually smaller and more solid; peristome not bright-coloured, very feebly expanded, sharp, whitish, and banded, even on the columellar margin. I am not quite sure whether I have correctly identified Reeve's species, as he gives no locality; but the Costa-Rican specimens before me agree very well with his figure. From the true *A. reflexa*, Swains., it is sufficiently distinct by its globose (not ovate) form.

13. **Ampullaria delattrei.** (Tab. XXIV. fig. 8.)

Ampullaria lattrei, Reeve, Conch. Icon. x., *Ampullaria*, t. 5. fig. 22 (1856) [1]; Tristram, P. Z. S. 1863, p. 414 [2].

Ampullaria delattrei, Fisch. & Crosse, Miss. Scient. Mex., Mollusca, ii. p. 246, t. 45. figg. 4, 4 *a* [3].

Globose, with short conical spire and rather deep suture, greenish-yellow, with narrow somewhat darker green bands; peristome yellow, with a black streak on the inside, as in some varieties of *A. flagellata*.

a. Long. 49, diam. 45; apert. long. 32, diam. 24 millim.
b. „ 46, „ 42; „ 32, „ 22 „
c. „ 38, „ 36½; „ 27, „ 20 „

a. Dimensions of Reeve's figure; *b*. Measurements given by Fischer and Crosse (diam. 32, as given in the text, is evidently a misprint for 42, as is proved by the figure); *c*. Specimen from Coban, collected by Conradt, with thin yellow peristome.

Hab. N. Guatemala: Lake of Peten (*Salvin* [2]); Cubilguitz (*Conradt*); Coban (*Delattre* [1], *Conradt*); Vera Paz, in marshes (*Morelet & Bocourt* [3]).

E. Guatemala: Valley of the Polochic River, in plenty (*Stoll*).

Distinct from *A. ghiesbreghti* and its varieties by the more regularly globose convexity of the last whorl and the lighter coloration; in other respects very near it.

I have not seen Salvin's specimen, but one from the same locality sent by Dr. O. Stoll, and from this our figure is taken. Fischer and Crosse (*loc. cit.*) give for *A. delattrei* still another figure, t. 48. figg. 7, 7 *a*, which differs considerably from the other and that given by Reeve, having a higher spire and another convexity of the last whorl; it is probable, therefore, that it does not belong to the same species *. They do not state where this particular specimen was found, but they give for the species generally, in addition to the localities mentioned above, S. Mexico, Isthmus of Tehuantepec (*Sumichrast*). Owing to this uncertainty, I prefer not to include the Mexican habitat in the range of the present species.

* This shell is not unlike Reeve's *A. swainsoni*, Phil., as figured by Hanley (Conch. Misc., *Ampullaria*, t. 1. figg. 1, 4) and by Reeve (Conch. Icon. x., *Ampullaria*, t. 27. fig. 128).

14. **Ampullaria yucatanensis.**

Ampullaria yucatanensis, Crosse & Fisch. Journ. de Conch. xxxviii. p. 110 (1890)[1]; Miss. Scient. Mex., Mollusca, ii. p. 240, t. 48. figg. 3, 3 *a*[2]; Pilsbry, Proc. Acad. Phil. 1891, p. 326[3].

Globose, rather thin, greenish with numerous inconspicuous bands, or dusky brown, nearly unicolorous; umbilicus very narrow. Outer margin of the aperture thin, scarcely expanded, yellowish, peculiarly projecting and arcuated in its upper third.

a. Long. 50, diam. 40; apert. long. 40, diam. 27 millim.
b. „ 48, „ 45; „ 39, „ 26 „
c. „ 50, „ 45; „ 35, „ 25 „
d. „ 32, „ 29; „ 25, „ 17 „

a. Fischer and Crosse's measurements, as given in the text; *b*. Dimensions taken from their figure; *c*. Dimensions of Godman's specimen; *d*. Paetel's specimen.

Hab. YUCATAN: San Gerónimo, in marshes (*Morelet*[2]); Dos Cenotas, Shkolak (*Heilprin*[3]); Merida (*F. D. Godman*).

The specimen in Paetel's collection, with the label *A. cumingi*, King, Panama (mounted side by side with a true *A. cumingi*), is comparatively somewhat broader and has the spire a little less elevated than in the example *b*, but it agrees more fully in these points with Fischer and Crosse's figure.

Var. *yzabalensis*, n. (Tab. XXIV. fig. 9.)

Umbilicus nearly closed and the spire comparatively a little higher; bands very faint; in other respects agreeing with Yucatan specimens.

Long. 44, diam. 39; apert. long. 33, diam. 22 millim.
„ 37, „ 31; „ 28, „ 18 „

Hab. E. GUATEMALA: Lake of Yzabal (*Stoll*).

Among the specimens given me by Dr. O. Stoll there is one with a more open umbilicus; but as it differs also somewhat in form and colour, I am not sure whether it is from the same locality.

15. **Ampullaria hondurasensis.** (Tab. XXIV. fig. 7.)

Ampullaria hondurasensis, Reeve, Conch. Icon. x., *Ampullaria*, t. 3. fig. 15 (1856)[1].

? *Pomus pyrum* (Phil.), Tate, Amer. Journ. Conch. v. p. 152 (1870)[2] (nec Phil.).

Testa globosa, obtecte perforata, verticaliter plicatulo-striata; olivacea, nitidula, fasciis angustis, extus vix conspicuis, basi paulo magis distinctis; spira brevis, obtuse conica; anfr. $4\frac{1}{2}$, tumidi, sutura profunda, ultimus sat inflatus; apertura elliptica, supra et infra rotundata, peristomate recto, basi levissime expansa, albida, retrorsum sublabiato, margine externo valde arcuato, columellari subverticali, dilatato, breviter reflexo, perforationem fere plane obtegente, fauce rufescente, inconspicue fasciata.

Long. 38, diam. $33\frac{1}{2}$; apert. long. 30, diam. 20 millim.

Hab. HONDURAS[1].

CENTRAL NICARAGUA: Lake of Nicaragua (*coll. Dunker*); River San Juan, its tributaries and creeks, River Panaloya, and in the Lake of Nicaragua at Granada (*Tate*[2]).

Allied in form to *A. delattrei* and *A. yucatanensis*, but differing from both in the

nearly closed umbilicus; in the single specimen before me from the Lake of Nicaragua a very narrow opening is just visible. The other known Central-American species with closed or nearly closed umbilicus, as *A. erogata*, *A. pealeana*, and *A. conoidea*, all differ in the general form of the shell. It is also the only American *Ampullaria* I have seen with a distinct thickening behind the outer margin of the aperture, a character often found in Indian and African species of the genus; nevertheless, the operculum is corneous, thin, concave, shining brown.

Tate [2] gives no description of his *Pomus pyrum*, but, to judge from the locality, it is probably referable to the present species. The true *A. pyrum*, Philippi (Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, *Ampullaria*, p. 18, t. 5. fig. 2), from Brazil, bears some resemblance to *A. hondurasensis*, but differs from it in being much attenuated beneath, as the specific name (pear) indicates, and in having a shorter spire and larger aperture.

III. HELICIFORMES.

16. **Ampullaria cerasum.** (Tab. XXIV. figg. 1–6.)

Ampullaria cerasum, Hanley, Conch. Misc., *Ampullaria*, t. 2. figg. 7 (1854–58) [1]; Reeve, Conch. Icon. x., *Ampullaria*, t. 21. fig. 99 [2].

Globose, solid, with somewhat elevated spire and moderately deep sutures; last whorl well rounded in its upper half, gradually attenuated in the lower half; surface rather smooth, but closely impressed with somewhat broad, unequal, vertical striæ, ashy-olive or dull chestnut-brown, with inconspicuous slightly darker bands; umbilicus moderate, cylindrical; aperture occupying about $\frac{2}{3}$ or rather more of the whole length, with thick, bright red or orange peristome; outer margin well arcuated; basal margin broadly rounded; columellar margin nearly vertical, thick, but only at its insertion reflexed, and concealing very little of the umbilicus.

a.	Long. 37,	diam. 32;	apert. long.	$27\frac{1}{2}$,	diam.	17	millim.
b.	„	33, „	31;	„	23,	„	16	„
c.	„	$23\frac{1}{2}$, „	24;	„	20,	„	15	„
d.	„	$23\frac{1}{2}$, „	23;	„	19,	„	12	„
e.	„	$20\frac{1}{2}$, „	$24\frac{1}{2}$;	„	17,	„	12	„
f.	„	20, „	19;	„	$16\frac{1}{2}$,	„	11	„

Hab. S.E. Mexico: Teapa in Tabasco (*H. H. Smith*).

The above measurements are taken from full-grown specimens from the same locality, all these having a thickened and bright-coloured peristome; the specimen *e* is much worn above and its length therefore is less than its diameter. The colour of the peristome is usually bright red, nearly scarlet, in some specimens orange: in all those before me this red or orange colour reaches to the very edge of the aperture, whereas in Reeve's figure the edge is whitish and the orange coloration is only visible inside behind it, but in the text he describes the peristome as bright scarlet; Hanley, too, terms the species "red-throated." The interior of the aperture is greyish-violet, with distinct darker bands.

Hanley [1] and Reeve [2] give simply "Mexico" as locality. Neither Strebel nor Fischer and Crosse mention this species, but H. H. Smith obtained a number of specimens.

17. **Ampullaria erogata.**

Ampullaria erogata, Crosse & Fisch. Journ. de Conch. xxxviii. p. 113 (1890) [1]; Miss. Scient. Mex., Mollusca, ii. p. 251, t. 46. figg. 6, 6 *a*, 7 [2].

Hab. S. Mexico: Cacoprieto, on the Isthmus of Tehuantepec (*Sumichrast* [2]).
N. Guatemala: Department of Peten (*Morelet* [2]).

I am somewhat doubtful about this species: Fischer and Crosse's fig. 6 agrees very well with *A. cerasum*, save in the pale reddish-grey colour of the peristome; fig. 7 has not the same globose appearance, but is somewhat more ovate, its spire is shorter, and the sutures are more superficial. In the explanation of the plate, fig. 7 is termed var. β, but in the text no mention of any variety is made; presumably the second of the two localities quoted, Cacoprieto, may be referred to fig. 7. The description gives "anguste perforata" and "perforation ombilicale à peine marquée, exagerée dans les figures 6 et 7"; both figures show the umbilicus as large as in *A. cerasum*. If it were not for these statements I should have treated their fig. 6 as representing a pale-mouthed specimen of *A. cerasum*.

IV. PATULÆ.

18. **Ampullaria cumingi.**

Ampullaria cumingi, P. King, Zool. Journ. v. p. 344 (1850–51) [1]; Philippi, in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, *Ampullaria*, p. 2, t. 2. fig. 3 [2]; Hanley, Conch. Misc., *Ampullaria*, t. 3. fig. 18 [3]; Reeve, Conch. Icon. x., *Ampullaria*, t. 17. fig. 81 [4].

Globose, solid, brown, somewhat banded, with conical spire, rather deep sutures, and comparatively small and narrow aperture.

a. Long. 42, diam. 36; apert. long. $31\frac{1}{2}$, diam. $26\frac{1}{2}$ millim.
b. „ 30, „ 28; „ $20\frac{1}{2}$, „ 15 „
c. „ 23, „ $21\frac{1}{2}$; „ 17, „ 11 „
d. „ 20, „ $19\frac{1}{2}$; „ 14, „ 10 „

Hab. N. Panama: Rio Chagres (*Dr. Kobelt*).
S. Panama: Island of Taboga, in the Bay of Panama (*P. King*).

There is some uncertainty regarding the true dimensions of this shell. The measurements given under *a* are taken from Reeve's figure; but King himself says in his short description [1]: "lat. $1\frac{7}{16}$, long. $1\frac{6}{16}$ poll.," the breadth (=diameter) agreeing very well with the above-mentioned figure, but not the length, which would thus be about $34\frac{3}{8}$ millim., instead of 42. In the late Dunker's collection there are two specimens of *A. cumingi* obtained from Consul Gruner of Bremen, who frequently exchanged shells with Cuming, both very pale brown and considerably smaller (measurements given

above under *c*), one with a few, the other without bands, but agreeing otherwise with King's description and Reeve's figure. A specimen in Paetel's collection (measurements *d*) is still smaller, otherwise similar. Philippi [2] drew his fig. 3 from one of Cuming's specimens, this figure being very near *c* in size, but remarkably narrower, diam. only $18\frac{1}{2}$ millim.; his fig. 2 has a very low spire, with flat suture, and it probably represents the young condition of another species. The measurements under *b* are taken from a specimen from Panama, given to me by H. Dohrn, this agreeing very nearly with Reeve's figure.

In the collection of the late Dunker there are also some eggs of this species, these measuring 4 millim. in their largest diameter.

19. **Ampullaria conoidea,** sp. n. (Tab. XXIV. figg. 10, 11.)

Testa elate conoidea, vix rimata, solida, verticaliter plicato-striata et lineis subtilissimis spiralibus sculpta, pallide fulva, fasciis nonnullis angustis fuscescentibus picta; anfr. 6, convexi, sutura sat profunda, ultimus globosus; apertura pro ratione generis parva, $\frac{3}{5}$—$\frac{7}{10}$ longitudinis occupans, oblongo-elliptica, peristomate leviter expanso, albo, margine externo valde arcuato, margine columellari crasso, appresso, rimam umbilicalem pæne prorsus claudente, superne in callum distinctum parietis aperturalis abeunte, fauce albida, fasciis pellucentibus.

Long. 30, diam. 24; apert. long. 19, diam. 14 millim.
„ 25, „ $21\frac{1}{2}$; „ 17, „ 13 „

Hab. Costa Rica (*Van Patten, in Mus. Berol.*).

This is a very remarkable species; it agrees with *A. oblonga*, Swains., and some allied forms in having the umbilicus nearly or quite closed by the thickened columellar margin, but differs from them in the high spire and the globose (not oblong) form of the last whorl. In one of our specimens, the larger one (*a*), the outer margin of the aperture is not expanded and unicolorous white; in the other (*b*) it is distinctly expanded and marked with the continuation of the bands. These are the only examples known to me.

20. **Ampullaria pealeana.** (Tab. XXIV. figg. 12, 13.)

Ampullaria pealeana, Lea, Obs. Unionidæ, ii. p. 16, t. 23. fig. 77 (1834) [1].
Ampullaria rufolineata (Reeve), v. Mart. Malak. Blätt. iv. p. 193 (1858) [2].

Long. 31, diam. 27; apert. long. 23, diam. 17 millim.
„ 24, „ 20; „ 18, „ 13 „

Hab. N. Panama: Veraguas (*Warszewicz*, circa 1850).
Colombia: Turbaco (*T. R. Peale*, 1834) [an Tumaco?]; Sierra Nevada de Santa Marta, northern slope, 1400 metres above the sea (*Sievers, in Mus. Berol.*).

Differs chiefly from the allied forms (*A. cumingi* and *A. conoidea*) in the shorter spire; the bands are very pale, scarcely visible; the apex, which is somewhat worn in the only specimens seen of *A. conoidea*, is here well preserved, shining, smooth,

and of a somewhat reddish-fawn-colour ; in the smaller example the umbilical rim is completely closed, in the larger one nearly so.

A. rufilineata, Reeve (Conch. Icon. x., *Ampullaria*, t. 2. fig. 7), is somewhat similar, but has a more open umbilicus and a shorter spire; it approaches nearer *A. figulina*, Spix.

Species of *Ampullaria* (sensu strict.) erroneously accredited to Mexico or Central America.

A. reflexa, Swains. : see note to *A. flagellata* (*anteà*, p. 409).

A. columbiensis, Sow. : see *A. flagellata*, var. *tristrami* (*anteà*, p. 413).

A. eximia, Dunker : ascribed in Paetel's Catalogue, ed. 4, p. 478, and in his collection, to Mazatlan ; it is really from the Lake of Maracaibo, in Venezuela, and Paetel's specimen agrees perfectly with typical examples from that locality in Dunker's and Albers's collections in the Berlin Museum.

A. pyrum (Phil.) : see *A. hondurasensis*, Reeve (*anteà*, pp. 420, 421).

A. retusa, Phil. : "Mexico, David," in Dunker's collection ; probably an erroneous locality, as it is only known otherwise from Guiana and Brazil. There is, however, a place named David in Chiriqui.

A. rufilineata, Reeve : see *A. pealeana* (*anteà*, pp. 423, 424).

Subgen. Ceratodes.

Ceratodes, Lansdown Guilding, Zool. Journ. iii. p. 540 (1828).
Marisa (part.), Gray, Philos. Mag. & Journ. lxiii. p. 276 (1824) *.

Shell discoidal, the progress of the whorls remaining in the same plane; aperture oblique.

Externally similar to *Planorbis*, but distinct, at first sight, by the obliquity of the aperture, which is directed towards the right side of the animal (in *Planorbis* to the left), the shell of *Ceratodes* being really dextral and the under half of the aperture projecting more forward than the upper half, as is the case in the other species of *Ampullaria*. Horny operculum, two pairs of feelers, and respiratory siphon as in the normal *Ampullariæ* [see the figure of the living animal of *A.* (*Ceratodes*) *cornu-arietis* in d'Orbigny's Voyage Am. mér., Moll. t. 48. figg. 7, 8, which is often copied].

* *Marisa*, Gray, was originally intended for all American *Ampullariæ*, as it is characterized only by the horny operculum and simple peristome, not by the form of the shell; and it was not before 1847 (P. Z. S. p. 148) that it was limited by the author himself to *A. cornu-arietis*, for which at that time the name *Ceratodes* was already available.

A. geveana, Desh., *A. glauca*, L. (*effusa*, Müll.), and *A. luteostoma*, Swains., constitute a gradual passage from *Ceratodes* to the ordinary form of *Ampullaria*.

All the species of this subgenus, like most of the true *Ampullariæ*, have dark spiral bands, whereas no known *Planorbis* is distinctly banded.

Geographical distribution: Costa Rica and the southernmost Caribbean islands (Tobago, Trinidad) to Southern Brazil and Argentina.

21. **Ampullaria rotula.** (Tab. XXV. figg. 1, 1 *a*, *b*.)

Ampullaria rotula, Mousson, in Malak. Blätt. xvi. p. 183 (1869) [1].

Ceratodes rotula, Mousson, ibid. xxi. p. 19 (1873) [2]; Pfr. Novit. Conch. iv. p. 138, t. 131. figg. 4–7 [3].

Rather inflated, greatest height (breadth) of the shell at the aperture distinctly more than half the greatest diameter; upper face (the right in the creeping animal) slightly inserted, the first whorls even, the last two somewhat elevated above the centre, the last at this point obtusely angulated; lower face (left) deeply and broadly excavated, the whorls being on this side also obtusely angulated and falling off steeply towards the centre; each whorl is thus distinctly seen as a spiral prominence in this excavation. Colour greenish-yellow or pale greenish-brown on the upper (right) face, darker on the lower (left) face; dark blackish-brown well-defined spiral bands, one or few narrow ones on the upper half, more on the under half of the periphery, none on the uppermost part; in one specimen the broad periphery and the lower face are of dark colour, with scarcely perceptible darker bands, contrasting with the pale upper face.

a.	Diam. maj.	40,	min.	29,	alt. prope apert.	22;	apert. diam.	15	millim.
b.	„	34,	„	28,	„	18;	„	14	„
c.	„	28,	„	22,	„	14;	„	11	„
d.	„	23,	„	17,	„	11;	„	9	„

a. Mousson's measurements; *b*, *c*. Seebach's specimens; *d*. Van Patten's specimen.

Hab. Costa Rica (*Van Patten & von Seebach, in Mus. Berol.*).

Colombia: Lower part of the Magdalena River (*Wallis* [1–3]); Ocaña, east of this river (*coll. Dunker*); Rio Hacha (*Sievers, Mus. Berol.*).

It is strange that neither H. Pittier nor P. Biolley has sent a specimen of this remarkable shell from Costa Rica; but as the Berlin Museum has received examples of it from that country from two different travellers, there cannot be any doubt as to its Central-American habitat.

VIVIPARA.

Vivipare, Cuvier, 1808; Lamarck, 1809.

Viviparus, Montfort, 1810; Frauenfeld, Verh. zool.-bot. Ges. Wien, xii. p. 1161 (1862).

Vivipara, Sowerby, 1813.

Paludina, Lamarck, 1812 (part.), auct.; Fischer & Crosse, Miss. Scient. Mex., Mollusca, ii. p. 280 (full description and historical account).

Shell of moderate size, oval or conoidal, rather thin, brownish or horn-coloured, often with spiral sculpture or spiral bands; aperture oval, angulated above. Operculum horny, concentric.

A single pair of stout feelers, the right one in the male thickened and shortened. Viviparous.

Geographical distribution nearly universal, but wanting on the continent of South America; well represented in North America, one species in the West Indies (Cuba), and one in Mexico. This latter is apparently not found in the lakes of Central Mexico, where large species of *Planorbis*, nearly allied to those of North America, are found in plenty.

1. Vivipara inornata.

Vivipara inornata, Binney, Am. Journ. Conch. i. p. 49, t. 7. fig. 1 (1865)[1]; Land and Freshw. Shells N. Am. iii. pp. 113, 114, fig. 225[2].

Paludina inornata (Binn.), Fisch. & Crosse, Miss. Scient. Mex., Mollusca, ii. p. 291[3].

Minutely perforate, globose-ovate, smooth, polished, greenish or pale olive, without spiral sculpture or spiral bands; whorls about 5, very convex; aperture exceeding half the length of the shell. Long. 19, diam. 17 millim.

Hab. Mexico: Chopatilo * [1–3].

Paludina carinata, Valenciennes, in Humboldt and Bonpland's Obs. Zool. ii. p. 252, t. 56. fig. 2 (1839), given by the authors as Mexican, belongs, without doubt, to the well-known *V. costata*, Quoy and Gaimard, from the Philippines; *H. ovum* and *H. stolephora*, Val., described in the same work, are also Philippine shells (*cf.* v. Mart. Malak. Blätt. xii. p. 71).

VALVATA.

Valvata, O. F. Müller, Verm. Terr. et Fluv. ii. p. 198 (1774), auct.; Fischer & Crosse, Miss. Scient. Mex., Mollusca, ii. p. 293 (full description and historical account).

Shell discoidal or depressed conoidal, of rather small size, umbilicate, unicolorous brownish; aperture circular, somewhat parallel to the axis of the whorls (thus differing from that of *Cochliopa* and of the smaller species of *Planorbis*). Operculum circular, thin, corneous, multispiral, with central nucleus. In addition to the one pair of long, slender feelers, a third feeler-like organ and a fine feather-shaped gill are exserted from the respiratory cavity when the living animal is fully developed. Hermaphrodite.

Widely distributed in the northern hemisphere; no species known from Cuba, Haiti, or Puerto Rico, the two Jamaican forms described by C. B. Adams perhaps not really belonging to this genus.

1. Valvata humeralis.

Valvata humeralis, Say, in New Harmony Disseminator of Useful Knowledge, ii. p. 244 (1829)[1]; Menke, Zeitschr. f. Malak. ii. p. 129 (1845)[2]; Binney, Land and Freshw. Shells of N. Am. iii. p. 14[3]; Pilsbry, Proc. Acad. Phil. 1891, p. 326[4]; Fisch. & Crosse, Miss. Scient. Mex., Mollusca, ii. p. 303[5].

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* As noted by Fischer and Crosse[3], the orthography of this word is probably incorrect. Dr. Seler informs me that there is a Rancho named Chapotillo, near Sinaloa, in N.W. Mexico, a Hacienda Chapotito at Cerralvo, in Nuevo Leon, near the Rio Grande del Norte, and a Rancho Chapotita in Michoacan, S.W. Mexico. It is most probable that a locality in N.E. or N.W. Mexico is meant.

Depressed, subglobose, transversely wrinkled (or with slightly raised lines); spire convex, not prominent; whorls $3\frac{1}{2}$, with the *shoulder depressed* (subsutural flattening) and an obtuse basal carina (*Pilsbry*); umbilicus rather large. Diam. less than $\frac{1}{5}$ of an inch (under 5 millim.).

Hab. CENTRAL MEXICO: lakes around the city of Mexico (*Heilprin* [4]).

Var. *pilsbryi*, n.

Valvata humeralis (Say), Pilsbry, loc. cit. p. 326 (specimens from Lake Patzcuaro) [6].

Whorls more rapidly increasing, without subsutural flattening, umbilicus narrower.

Hab. CENTRAL MEXICO: Lake Patzcuaro (*Heilprin* [6]).

Var. *strebeli*.

Valvata humeralis (Say), Strebel, Beitr. Mex. Land- und Süssw.-Conch. i. p. 33, t. 4. fig. 42 (shell and operculum) (1873) [7].

Valvata strebeli, Fisch. & Crosse, Miss. Scient. Mex., Mollusca, ii. p. 304 (1891) [8].

Depressed-conoidal, with wide umbilicus, and fine, closely set, raised striæ across the whorls, greenish-horn-coloured; whorls $3\frac{1}{2}$–$3\frac{3}{4}$, rounded, without spiral keel. Diam. maj. 5, min. 4, alt. 4 millim.; aperture $2\frac{1}{2}$ millim. in diameter, and $2\frac{1}{2}$–$2\frac{5}{8}$ high.

Hab. CENTRAL MEXICO: City of Mexico, in company with *Planorbis tenuis*, *Limnæa attenuata*, and *Physa osculans* (*Strebel* [7 8]).

It is much to be regretted that Pilsbry did not give a figure or the exact measurements of *V. humeralis*, of which he had typical specimens, as well as others collected by Prof. Heilprin, before him. Fischer and Crosse, it is true, give fairly good characters to distinguish *V. humeralis* from *V. strebeli*; nevertheless the two forms are very probably varieties of one species. The following points should be noted: (1) the similarity of the sculpture; (2) the known variability of the elevation of the spire in the European *V. piscinalis*; (3) the fact that H. Pilsbry himself unites with *V. humeralis* the specimens from Lake Patzcuaro which want the subsutural flattening; (4) it is not very probable that of two nearly allied species living in the vicinity of the city of Mexico, Strebel should have found only the one and the two North-American travellers, Say and Heilprin, only the other.

For *Valvata guatemalensis*, Morel., see the genus *Cochliopa*.

COCHLIOPA.

Cochliopa, Stimpson, Amer. Journ. of Conch. i. p. 52 (1865); Researches upon the Hydrobiinæ (Smithsonian Misc. Coll. no. 201), p. 50 (1865).

Shell short-conoidal, solid, umbilicated, with fine spiral sculpture, and angulated at the base, greenish or olivaceous-brown without; aperture very oblique, ovate, angulated above, the columellar margin somewhat dilated and expanded. Operculum thin, corneous, subspiral. Tentacles rather long, tapering.

The shell resembles in many respects that of *Valvata*, but may be distinguished

by the spiral sculpture (which is more distinct near the periphery and on the lower side), its solidity, and the very oblique, oval (not circular) aperture. Moreover, the form of the operculum and radula is quite different, resembling that of the Hydrobiinæ.

Hitherto known from California and Central America.

Comparative Table of the Species of *Cochliopa*.

Nomen.	Forma.	Sculptura.	Umbilicus.	Apertura.	Diam.	Alt.	Anfr.	Patria.
guatemalensis, *Morel.*	depressa.	subtiliter decussata.	angustus.	marg. non continuis.	mm. $3\frac{1}{2}$	mm. $2\frac{1}{2}$	$4\frac{1}{2}$	W. Guatemala.
tryoniana, *Pilsbr.*.	obtuse subconica, angulata.	spiratim sulcata.	latus, rotundatus.	marg. callo junctis.	4–$5\frac{1}{2}$	$3\frac{1}{3}$–$4\frac{3}{4}$	4–$4\frac{1}{2}$	W. Nicaragua, S.W. Costa Rica.
trochulus, *v. Mart.*	trochiformis, carinata.	sulcis spiralibus parum conspicuis vel nullis.	sat angustus, subangulatus.	„	5–6	4–5	$4\frac{1}{2}$	S.W. Costa Rica.
? infundibulum, *v. Mart.*.....	gradatim pyramidata, peripheria rotundata.	spiratim sulcata, sub sutura radiatim incisa.	perspectivus, angulatus, valde sulcatus.	marg. continuis.	$3\frac{2}{3}$	4	5	Guatemala.

1. Cochliopa guatemalensis.

Valvata guatemalensis, Morelet, Test. Noviss. ii. p. 22 (1851)[1]; Fisch. & Crosse, Miss. Scient. Mex., Mollusca, ii. p. 302, t. 48. figg. 2, 2 *a*, *b*, t. 50. figg. 1, 1 *a*, *b*[2].

Hab. W. Guatemala: River Michatoya, near the port of Istapa (*Morelet*[1 2]).

I have not seen a specimen of this shell, but, according to the description and figure, it is so much like the following in general form and sculpture, and in the outlines of the aperture, that it must belong to the same genus, if not to the same species; it seems, however, to be smaller and more flattened.

2. Cochliopa tryoniana. (Tab. XXIII. figg. 9, 9 *a–c*.)

Cochliopa tryoniana, Pilsbry, in Nautilus, iv. p. 52 (Sept. 1890)[1]; Proc. Acad. Phil. 1891, p. 331, t. 15. fig. 12[2].

Shell subconical, convex above, flattened below, more or less distinctly angulated at the periphery; many fine spiral furrows on both faces, which do not, however, modify the convexity; colour greenish-brown; whorls 4–$4\frac{1}{2}$, separated by somewhat deep sutures; umbilicus open, its walls falling in gradually, so that no distinct external limit of it can be made out. Aperture diagonally oblique, narrowed above, pear-shaped; outer margin thin, somewhat convexly projecting, inner (columellar) margin thickened near the insertion and united with the insertion of the outer margin by a conspicuous glossy callus; interior of the aperture bluish.

Diam. maj. 4–$5\frac{1}{2}$, min. $3\frac{1}{2}$–$4\frac{1}{2}$, alt. $3\frac{1}{3}$–$4\frac{3}{4}$; apert. diam. 3, alt. obliqua 4 millim.

Hab. W. Nicaragua: Realejo, near Leon (*Mus. Berol.*); Polvon and Rio Fula (*Heilprin*[1 2]).

S.W. Costa Rica: Great Range between the Rio Grande and Boruca, Nov. 1891;

middle course of the Rio Pamare, Pacific slope, Dec. 1891; Rio Punta Mala, 20 metres above the sea, April 1892 (*Pittier*).

Pittier's two specimens are smaller than those from Nicaragua, but I cannot see any other difference.

3. **Cochliopa trochulus,** sp. n. (Tab. XXIII. fig. 2.)

Testa trochiformis, subanguste umbilicata, striatula, viridi-fusca, apice nigricante, sulcis spiralibus paucis vel nullis, carina acuta utrinque impresso-marginata, usque ad aperturam persistente; anfr. $4\frac{1}{2}$, parum convexi, sutura mediocri, interdum subgradata discreti, ultimus basi planatus; apertura diagonalis, piriformis, margine externo tenui, columellari crassiusculo, subreflexo, callo perlato margines jungente, fauce cærulescente.

Diam. maj. 5–6, min. $4\frac{1}{3}$–5, alt. 4–5; apert. diam. 3–$3\frac{1}{2}$, alt. obliqua 4 millim.

Hab. S.W. Costa Rica: Rio Grande de Terraba, at El Pozo, in gravel, 25–50 metres above the sea, March 1892, and marshes of Sierpe, on aquatic plants, April 1892 (*Pittier*); El Pozo, Dec. 1892 (*Biolley*).

This species is very near the preceding, but differs from it in having a sharp keel in the periphery, limited on each side by a visible depression which reaches the aperture; while *C. tryoniana* has a somewhat prominent line at the commencement of the last whorl only, the latter being simply angulated. Moreover, in *C. trochulus* the whorls are less convex on the upper side and flatter on the lower side, the umbilicus is narrower and more distinctly circumscribed, and the spiral furrows are scarcely visible. The colour is almost alike in both, except that in well-preserved specimens of *C. trochulus* the apex is usually blackish-violet (in *C. tryoniana* pale greenish), and in full-grown ones the peristome is furnished with a blackish edge. I have examined twenty-two specimens of *C. trochulus* of different ages, and fourteen of *C. tryoniana*, and find that the above-mentioned differences are fairly constant in specimens from the same locality; but it is quite possible that intermediate forms will be found.

4. **Cochliopa (?) infundibulum,** sp. n. (Tab. XXIII. fig. 3.)

Testa pyramidata, perspective umbilicata, leviter spiratim sulcata; anfr. 5, gradati, valde convexi, ultimus infra suturam planatus et radiatim incisus, umbilico lato, distinctius spiratim sulcato, angulo circumdato; apertura valde obliqua, piriformis, peristomate continuo.

Diam. maj. $3\frac{2}{3}$, min. $3\frac{1}{3}$, alt. 4; apert. diam. 2, alt. obliqua $1\frac{1}{2}$ millim.

Hab. Guatemala (*Mus. Berol.*).

Two bleached specimens of this shell have been sent to the Berlin Museum by H. v. Ihering. It is doubtful if they belong really to the genus *Cochliopa*; but the pear-shaped aperture, the slightly thickened columellar margin, and the spiral sculpture give them somewhat the appearance of the preceding species. It may be a lacustrine form, perhaps from the Lake of Peten.

I may mention here that in the fresh waters of Mexico and Central America, as in those of many other countries, spirally twisted cases or shell-like objects are to be found which might be easily mistaken for true shells of the genera *Valvata* or *Cochliopa*; but which, at first sight, differ from those forms in their coarsely tuberculated external structure, due to being composed of small agglutinated fragments of stones, the work of insect-larvæ of the genus *Helicopsyche*, family Phryganeidæ. The Berlin Museum possesses specimens of such cases from the Rio Colipa in Mexico, collected by Deppe, and formerly named *Paludina agglutinans*; also others from Orizaba, collected by Berendt, and some from the Rio Torres, San Francisco, Costa Rica, collected by H. Pittier; Salvin also found a similar case at Coban, Guatemala. They are depressed-conoidal, umbilicated, 5 millim. in diameter and 2–3 millim. in height; the spiral whorls are dextral, as usual in shells, whereas there are some similarly formed cases of terrestrial larvæ of insects (fam. Psychidæ, gen. *Cochlophora*), composed of sand or mud, which are sinistral. (See v. Martens, in Sitzungsberichte d. Gesellsch. naturforsch. Freunde in Berlin, 1891, p. 83.)

AMNICOLA.

Amnicola, Gould & Haldeman, Monogr. Limniades, Suppl. p. 3 (1840); Binney, Land and Freshw. Shells of N. Am. iii. p. 80; Fischer & Crosse, Miss. Scient. Mex., Mollusca, ii. p. 256.

Shell of small size, thin, ovate or oblong, of 4–6 whorls, generally smooth, in some species keeled and spinous, mostly perforated; aperture ovate, angulated above, rounded beneath, peristome continuous, simple.

Operculum paucispiral, horny.

Tentacles long, filiform; eyes at their outer base.

Central tooth of the radula broadly triangular, with numerous cusps, and with several denticules on its plane near the base; lateral and marginal teeth long, somewhat curved, the lateral (intermediate) one with several distinct cusps, the two marginal teeth finely crenulated.

I adopt here the classification of Fischer and Crosse, who place all the small Hydrobioid shells of Mexico and Central America, except *Tryonia*, in this genus, not because I am convinced that they are all congeneric with the North-American *A. limosa*, Say, but because I cannot offer a more satisfactory arrangement. For the same reason, it is useless to discuss the geographical distribution of this genus, as it is extremely doubtful.

1. Amnicola petenensis.

Paludina petenensis, Morelet, Test. Noviss. ii. p. 21 (1851) [1].

Amnicola petenensis, v. Frauenfeld, Verh. zool.-bot. Ges. Wien, xiv. p. 635 (1864) [2]; Fisch. & Crosse, Miss. Scient. Mex., Mollusca, ii. p. 262, t. 50. figg. 3, 3 *a*, *b* [3].

Hab. N. Guatemala: Lake Itza, Province of Peten (*Morelet* [1–3]).

Comparative Table of the Species of *Amnicola*.

Nomen.	Figura.	Sculptura.	Anfractus.	Apert. in long.	Long.	Diam.	Patria.
petenensis, *Morel.*	conoideo-ovata, perforata.	striatula, nitidula.	5, convexi, ult. ventricosus.	½	mm. 6	mm. 4	N. Guatemala.
panamensis, *Tryon*	conica, leviter perforata.	lævis, nitida.	4, valde convexi.	⅔	4½	3	E. Nicaragua, W. Panama.
orizabensis, *Cr. & F.*	ovato-turbinata, umbilicata.	subtiliter striatula.	5½, valde convexi.	½	5	3½	E. Mexico.
hyalina, *Morel.*	ovato-conoidea, vix perforata.	minute striatula.	4, leviter convexi.	½	4	3	W. Guatemala, S.W. Costa Rica.
rhegoides, *Morel.*	oblongo-conoidea, anguste perforata.	læviuscula, virescens.	5-6, convexi.	⅔	4–5	2	Salvador.
coronata, *Pfr.*	ovato- vel oblongo-conoidea, rimata.	carina prominula, spinulosa.	5–6, carinati.	⅔–½	4½–5	2–2½	Texas, E. Mexico, Yucatan, Salvador, W. Nicaragua, &c.
——, var. unicarinata, *v. Mart.*.....	,,	carina simplici.	,,	⅔	4–5	2–3	Centr. & E. Mexico, &c.
——, var. crystallina, *Pfr.*.....	,,	lævis vel obsolete spiratim striata.	5, leviter convexi.	⅔	4–5	2–3	E. Mexico, Yucatan, Salvador, &c.
palomaensis, *Pilsbr.*.....	ovata, minute perforata.	lævis, translucida.	5½, convexi.	⅝	4	1⅘	N. Centr. Mexico.
costaricensis, *Mörch*	ovato-conoidea, anguste perforata.	lævis.	4, valde convexi.	½	2	1⅓	Centr. Costa Rica.
seemanni, *Frauenf.*	conoideo-turrita, anguste perforata.	lævis, translucida.	5½, convexi.	⅝	4	1⅘	N. Centr. Mexico.
subangulata, *v. Mart.*	conoidea, subangulata, imperforata.	lævis, fusca.	5, convexiusculi.	1⅝	4	2½	Centr. & E. Costa Rica.
bakeri, *Pilsbr.*	conoideo-turrita, clause rimata.	subtiliter striata, decussata.	5½, convexi.	⅓–1⅜	4	1 1⅜	Centr. Mexico.
? hydrobioides, *Ancey*	elongato-turrita, anguste perforata.	lævigata, hyalina.	6, ult. oblongo-ventricosus.	⅓	4¼	2⅛	Salvador.
melanioides, *v. Mart.*	oblongo-lanceolata, imperforata, marg. col. incrassato.	lævis, nitidula, periostraco obscuro.	4–5, planiusculi.	½	6½	2½	S.W. Costa Rica.
——, var. tenuis, *v. Mart.*	oblongo-lanceolata, imperforata.	lævis, nitidula, tenuis.	6, planiusculi.	⅔–1⅝	4½–6¼	1⅝–2⅓	S.W. Costa Rica.

2. **Amnicola panamensis.**

Amnicola panamensis, Tryon, Proc. Acad. Phil. 1863, p. 146, t. 1. fig. 6 [1]; Tate, Amer. Journ. of Conch. v. p. 153 (1870) [2].

Hab. E. Nicaragua: Javali, in the Chontales district, at an elevation of 1750 feet, in a swampy pool at the roots of aquatic plants (*Tate* [2]).

W. Panama: Panama (*Capt. Field* [1]).

3. **Amnicola orizabensis.**

Amnicola cincinnatiensis (Anthony), Tryon, Amer. Journ. of Conch. ii. p. 11 (1866) [1].

Amnicola orizabensis, Crosse & Fisch. Journ. de Conch. xxxix. p. 24 (1891) [2]; Miss. Scient. Mex., Mollusca, ii. p. 263, t. 50. figg. 4, 4 *a*, *b* [3].

Hab. E. Mexico: near Orizaba (*Sallé* [3]; *Botteri* [1–3]); Mexico, without nearer indication of locality (*Uhde, in Mus. Berol.*).

4. **Amnicola hyalina.**

Paludina hyalina, Morelet, Test. Noviss. ii. p. 21 (1851) [1] (nec Anton, 1839) (not *hyalina*, Lea, 1864, Obs. Unionidæ, ii., which is a deformity of *Planorbis exacutus*, Say); Küster, in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, *Paludina*, p. 61, t. 11. figg. 21, 22 [2].

Hydrobia (?) *hyalina*, v. Frauenf. Verh. zool.-bot. Ges. Wien, xiv. p. 614 (1864) [3].

Amnicola guatemalensis, Fisch. & Crosse, Miss. Scient. Mex., Mollusca, ii. p. 264, t. 50. figg. 5, 5 *a*, *b* [4].

Hab. W. Guatemala: Lake of Amatitlan (*Morelet* [1–4]).

S.W. Costa Rica: marshes of Sierpe, 5 metres above the sea, on aquatic plants, April 1892 (*Pittier*).

5. **Amnicola rhegoides.** (Tab. XXII. fig. 4.)

Paludina rhegoides, Morelet, Test. Noviss. ii. p. 22 (1851) [1].

Hab. Salvador: Lake Coatepeque (*Morelet* [1 2]).

I am indebted to Mr. Edg. A. Smith for a drawing of this little-known species from Morelet's type, now in the British Museum. According to his note, the largest specimen is 5 millim. long, with six whorls, narrowly perforated, of greenish-yellow colour, the peristome continuous, slightly thickened.

The name *rhegoides*, from the Greek word ῥηγὴ (rim or slit), refers to the narrow perforation.

6. **Amnicola coronata.**

Paludina coronata, Pfr. in Wiegmann's Archiv f. Naturg. 1840, p. 253 [1]; Philippi, Abbild. neuer Conch. i., *Paludina*, p. 118, t. 1. fig. 17 [2]; Küster, in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, *Paludina*, p. 51, t. 11. figg. 9–12 [3].

Hydrobia (*Pyrgula*) *coronata* (Pfr.), v. Mart. in Wiegmann's Archiv f. Naturg. xxiv. p. 192 (1858) [4].

Amnicola coronata (Pfr.), Fisch. Journ. de Conch. viii. p. 363 (1860) [5]; Crosse, Journ. de Conch. xxviii. p. 264 (1890) [6]; Fisch. & Crosse, Miss. Scient. Mex., Mollusca, ii. p. 265, t. 50. figg. 6, 6 *a–c* [7].

Paludestrina coronata, Chenu, Manuel de Conch. i. p. 303, fig. 2139 [8].

Hydrobia coronata, v. Mart. Binnen-Moll. Venezuela's (Festschr. d. Ges. naturf. Freunde in Berlin, 1873), p. 52 (208), t. 2. figg. 13 *a–h* [9] (radula and embryonal shell); Strebel, Beitr. Mex. Land- und Süssw.-Conch. i. p. 33, t. 5. fig. 34 (1873) [10].

Pyrgulopsis coronatus, Ancey, Bull. Soc. Malac. Fr. v. p. 197 (1888) [11].

Potamopyrgus coronatus (Pfr.), var., Pilsbry, Proc. Acad. Phil. 1891, p. 328 [12].

Melania spinifera, C. B. Adams, Proc. Bost. Soc. Nat. Hist. ii. p. 9 (1845) [13]; Contrib. Conch. i. p. 45 [14].

Paludestrina candeana, d'Orbigny, in Ramon de la Sagra's Hist. fis. polit. y nat. de Cuba, Moluscos, p. 153, t. 10. figg. 13, 14 (1845) [15]; Macé, Journ. de Conch. xxxi. p. 32 (1883) [16].

Amnicola candeana, Petit, Journ. de Conch. v. p. 152 (1856) [17]; Bean, Cat. Coquilles de Guadeloupe, p. 17 (1858) [18].

Paludina ornata, Morelet, Test. Noviss. ii. p. 21 (1851) [19].

Amnicola ornata, Fisch. Journ. de Conch. viii. p. 364 (1860) [20].

Tryonia ornata, Tate, Amer. Journ. of Conch. v. p. 153 (1870) [21].

Amnicola crystallina, var. *β. coronata* and var. *γ. spinifera*, Shuttleworth, Mittheil. naturf. Ges. Bern, 1854 (Diagn. neuer Moll. vii.), p. 159 [22].

Amnicola crystallina, var., v. Frauenf. Sitzungsber. d. Akad. Wiss. Wien, xviii. p. 83 (1856) (part.) [23].

Hydrobia cristallina (Pfr.), v. Frauenf. Verh. zool.-bot. Ges. Wien, xiv. pp. 513, 588, 593, 595, 615, 648 (Verz. d. Namen v. *Paludina*, pp. 3, 33, 35, 55, 88) [24].

Pyrgulopsis spinosus, Call & Pilsbry, Proc. Davenport Acad. Sci. v. p. 14, t. 2. figg. 17–19 (1886) [25]; Ancey, Bull. Soc. Malac. Fr. v. p. 192 (1888) [26].

Pyrgulopsis nicaraguanus and *wrighti*, Ancey, Bull. Soc. Malac. Fr. v. pp. 194, 199 (1888) [27].

Hab. North America: Texas [11 25].

E. Mexico: Vera Cruz, in plenty, in mud and sand in a subfossil state, especially in the Laguna de los Cocos (*Strebel* [10]); Vera Cruz [11].

Yucatan: Merida and Shkolak (*Heilprin* [12]).

Salvador: Lake Coatepeque (*Morelet* [19], *Ancey* [27]).

W. Nicaragua: on the muddy shores, and in pools by the margins, of the Lake of Nicaragua; La Playa, Granada (*Tate* [21]); Lake of Nicaragua (*Ancey* [27]).

Colombia: Barranquilla, near the mouth of the Magdalena River [7].

Venezuela: Lake of Valencia, in a subfossil state [9].

Antilles: Cuba [1], Jamaica [13], Puerto Rico [22], Vieque [22], Guadeloupe [18], St. Thomas [22], St. Martin [16], St. John [22].

Var. *unicarinata*, n.

Hydrobia coronata (Exemplare mit dornenloser Kante), v. Mart. Binnen-Moll. Venezuela's, p. 52 [28]; Strebel, Beitr. Mex. Land- und Süssw.-Conch. i. p. 34, t. 5. fig. 34 *a* [29].

Pyrgulopsis (?) *patzcuarensis*, Pilsbry, in Nautilus, v. p. 9 (1891)[30]; Proc. Acad. Phil. 1891, p. 330, t. 15. fig. 8[31].

Hab. Central Mexico: Lake Patzcuaro (*Heilprin*[30 31]).

E. Mexico: Vera Cruz (*Strebel*[29]).

Antilles: Vieque (*Blauner*[28]).

Var. *crystallina*.

Paludina crystallina, Pfr. in Wiegmann's Archiv f. Naturg. 1840, p. 253[32]; Philippi, Abbild. neuer Conch. i., *Paludina*, p. 118, t. 1. fig. 18[33]; Küster, in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, *Paludina*, p. 50, t. 10. figg. 7, 8[34].

Amnicola crystallina, Shuttleworth, Mittheil. naturf. Ges. Bern, 1854 (Diagn. neuer Moll. vii.), p. 159[35].

Hydrobia cristallina (Pfr.), v. Frauenf. Verh. zool.-bot. Ges. Wien, xiv. p. 593 (Verz. d. Namen v. *Paludina*, p. 33) (1864)[36].

Paludina anthracina, Mighels, Proc. Bost. Soc. Nat. Hist. ii. p. 22 (1845)[37].

Paludina jamaicensis, C. B. Adams, Contrib. Conch. i. p. 42 (1849)[38].

Paludina cisternicola, Morelet, Test. Noviss. ii. p. 21 (1851)[39].

Amnicola coronata, var. γ. *inermis*, Fisch. Journ. de Conch. viii. p. 363 (1860)[40].

Hydrobia coronata, var., Strebel, Beitr. Mex. Land- und Süssw.-Conch. i. p. 34[41].

Amnicola coronata, var. β. *crystallina*, Fisch. & Crosse, Miss. Scient. Mex., Mollusca, ii. p. 266, t. 1. figg. 6 *d*, 6 *e*[42].

Pyrgulopsis nicaraguanus, varr., and *wrighti*, varr., Ancey, Bull. Soc. Malac. Fr. v. pp. 196, 197, 200[43].

Hab. E. Mexico: Vera Cruz (*Strebel*[41]).

Yucatan: in cisterns in the city of Campeche (*Morelet*[39]); Sisal (*Morelet*[42]).

Salvador: Lake Coatepeque (*Morelet*[42], *Ancey*[43]).

W. Nicaragua: Lake of Nicaragua (*Ancey*[43]).

Antilles: Cuba[32], Jamaica[38], Vieque[35], Tortola[37], Guadeloupe.

Operculum corneous, subspiral, radiately marked (*Tate*).

Strebel has also found living specimens near Vera Cruz in ditches near the railway, also in a shallow one with slowly-flowing, badly-smelling water, receiving the outlet of gasworks; but he cannot state to which variety these examples belong. At all events his observation corroborates the fact stated by me in 1858, that the animals of this genus are rather indifferent to the quality of the water.

7. **Amnicola palomaensis.**

Bythinella palomaensis, Pilsbry, in Nautilus, ix. p. 68 (1895)[1].

Hab. N. Central Mexico: Laguna de Palomas, State of Chihuahua (*Dr. E. A. Mearns*[1]).

The author refers this shell to the genus *Bythinella*, which is numerously represented in Europe, the species being found chiefly in springs, the number of whorls (4) and the obtuse apex agreeing well with that division. He says that *B.* (*Potamiopsis*) *binneyi*, Tryon, and *B. brevissima*, Pilsbry, are conchologically its nearest allies among the North-American forms.

8. **Amnicola costaricensis.** (Tab. XXII. fig. 6.)

Hydrobia costaricensis, Mörch, Malak. Blätt. vii. p. 67 (1860-61) [1]; v. Frauenf. Verh. zool.-bot. Ges. Wien, xiv. p. 594 (1864) [2].

A very small shell, with convex whorls (4) and narrow perforation.
Long. 2, diam. $1\frac{1}{3}$; apert. long. 1, diam. $\frac{2}{3}$ millim.

Hab. Central Costa Rica: Rio Torre (Torres) (*Dr. Œrsted*, 1846–48 [1 2]); San José, in an irrigation-tube (*Biolley*, March 1891).

Biolley's shell is somewhat incrusted, so that I can add nothing to Mörch's description of its surface.

9. **Amnicola (?) seemanni.**

Hydrobia seemanni, v. Frauenf. Verh. zool.-bot. Ges. Wien, xiii. p. 1025 (1863) [1]; xiv. p. 645 (1864) [2]; xv. p. 1, t. 8. fig. 1 [3]; Fisch. & Crosse, Miss. Scient. Mex., Mollusca, ii. p. 271 [4].

Hab. N. Central Mexico: Durango, in small streams (*Dr. Seemann* [1–4], *in coll. Cuming*; *Mus. Vind. Cæs.*).

Pilsbry (Nautilus, xii. no. 11, p. 122) suggests that this species may be a smooth variety of *Tryonia protea*, A. Gould, which occurs in the Colorado Desert.

10. **Amnicola subangulata,** sp. n. (Tab. XXII. fig. 5.)

Bythinella sp., Biolley, Moluscos terr. y fluv. de Costa Rica, p. 18 (1897) [1].

Testa conoidea, subangulata, imperforata, solida, fusca, lævigata; anfr. 5, regulariter crescentes, plani, ultimus peripherice subangulatus, basi convexus; apertura sat obliqua, ovata, supra angulata, peristomate simplici, crassiusculo, margine externo parum, margine basali late rotundato, margine columellari leviter concavo, callo parietali distincto.
Long. 4, diam. $2\frac{1}{2}$; apert. long. et diam. $1\frac{2}{3}$ millim.

Hab. Central Costa Rica, Rio Torres, in the environs of San José, on stones, 1100 metres above the sea (*Biolley* [1]).

E. Costa Rica: between Madre de Dios and Rio Hondo, in a small stream 80 metres above the sea (*Pittier*, Nov. 1896).

In general appearance this species resembles the brackish-water *Hydrobiæ*, such as *H. ulvæ*, Penn.; but the indicated locality is that of a true freshwater shell.

11. **Amnicola (?) bakeri.**

Potamopyrgus bakeri, Pilsbry, in Nautilus, v. p. 9 (1891) [1]; Proc. Acad. Phil. 1891, p. 328, t. 15. figg. 9–11 [2].

Hab. Central Mexico: east of Yautepec (south-east of Cuernavaca), State of Morelos, Pacific slope, dug from the bank of a stream (*F. C. Baker*, expedition of Prof. Heilprin [1 2]).

12. **Amnicola (?) hydrobioides.**

Pyrgulopsis hydrobioides, Ancey, Bull. Soc. Malac. Fr. v. p. 201 (1888) [1].

Hab. Salvador: Lake of Coatepeque [1].

Ancey found only one specimen among a number of *A. wrighti*, and says that it is very like ("tout-à-fait") the *Hydrobia ulvæ* of the coasts of France; if so, one might be tempted to suggest that it was really an example of that species which by some accident had been placed among the Central-American shells in his collection.

13. **Amnicola (?) melanioides,** sp. n. (Tab. XXII. fig. 8.)

Testa oblongo-lanceolata, imperforata, lævis, nitidula, periostraco olivaceo-nigricante tecta, apice obtuso; anfr. 4–5, planiusculi, regulariter crescentes, sutura superficiali, ultimus oblongo-ovatus, basi leviter convexus, a dorso visus $\frac{1}{2}$ fere longitudinis testæ occupans; apertura paulum obliqua, anguste ovata, superne acutangula, margine externo tenui, vix arcuato, margine basali valde arcuato, margine columellari valde incrassato, cærulescente, sensim in callum parietalem transeunte, fauce cærulescente.

Long. $6\frac{1}{2}$, diam. $2\frac{1}{2}$; apert. long. 3, diam. $1\frac{3}{4}$ millim.

Hab. S.W. Costa Rica; Golfo Dulce, Rio de Los Platanales (*Pittier*, 1896).

Var. *tenuis*, n. (Tab. XXII. fig. 9.)

Testa magis tenui, olivaceo-fusca; anfr. 6, margine columeilari non incrassato, fauce albida.

a. Long. $4\frac{1}{4}$, diam. $1\frac{3}{4}$; apert. long. vix 2, diam. $1\frac{1}{3}$ millim.
b. „ $6\frac{1}{4}$, „ $2\frac{1}{2}$; „ $2\frac{1}{2}$, „ $1\frac{2}{3}$ „

Hab. S.W. Costa Rica: in a small stream running into the Rio Boto at Golfo Dulce (*Pittier*, March 1896: form *a*); marshes of Seripe, 5 metres above the sea, on aquatic plants (*Pittier*, April 1892: form *b*, often somewhat incrusted).

As neither operculum nor radula could be examined, the generic position of this shell remains rather doubtful.

TRYONIA.

Tryonia, Stimpson, Amer. Journ. of Conch. i. p. 54 (1865); Researches on Hydrobiinæ (Smithson. Misc. Coll. no. 201), p. 48 (1865).

Shell turrite, longitudinally ribbed, not spinous; aperture oval, spreading at the base; peristome simple, continuous, appressed on the columellar side. Operculum and radula unknown.

Geographical distribution, California and Central America.

1. **Tryonia exigua.**

Melania exigua, Morelet, Test. Noviss. ii. p. 23 (1851) [1]; Reeve, Conch. Icon. xii., *Melania*, t. 58. fig. 460 [2]; Brot, Matériaux étud. fam. Mélaniens, p. 42 (1862) [3] (nec *M. exigua*, Conrad, 1855, = *Tryonia protea*, A. Gould).

Tryonia exigua, Fisch. & Crosse, Miss. Scient. Mex., Moll. ii. p. 275, t. 50. figg. 2, 2 *a*, *b* [4].

Melania minuta, Brot. loc. cit. p. 43 [5].

Nearly imperforate; whorls 6–$7\frac{1}{2}$, not very convex, angularly shouldered at the suture, with strong, smooth, longitudinal ribs, about 12–13 on the last whorl.

Long. 7–$8\frac{1}{2}$, diam. 3; apert. long. 2–$2\frac{1}{2}$, diam. $1\frac{2}{3}$–2 millim.

Hab. N. Guatemala: Lake Itza, Peten (*Morelet* [1–5]).

Only known in a subfossil state.

See also *Amnicola seemanni*, page 435.

PACHYCHILUS.

Pachychilus, Lea, P. Z. S. 1850, p. 179; Ann. & Mag. Nat. Hist. (2) ix. p. 58 (1852); Troschel, Gebiss. d. Schnecken, i. p. 114 (part.); Fischer & Crosse, Miss. Scient. Mex., Moll. ii. p. 320 (nec *Pachychila*, Eschscholtz, 1831).

Shell turrite or at least conical, longer than broad, with fine spiral striæ, and covered by a distinct greenish, brownish, or blackish periostracum, sometimes tuberculated; aperture oblong, angulated above, produced more or less distinctly in a short angular lobe below (except in the subgenus *Potamanax*); columellar margin not notched or truncate, often thickened.

Operculum horny, of about six whorls; its nucleus subcentral in about one-third of its height. Radula: central tooth with an elevated swelling in the centre of its plane; lateral teeth bi- or tricuspid. Edges of the mantle simple, uninterrupted. Eyes at the outside of the base of the feelers.

The living animals of this genus prefer running water, rivers, or small streams, and are often found attached to stones; the upper whorls of full-grown shells are never complete and usually more or less eroded, so that they are devoid of the periostracum, uneven, and of a greyish or pure white colour. This erosion seems to be caused partly by the rubbing of the shell against the stones, and partly by chemical action, due probably to the attacks of microscopic algæ. M. Gassies has observed in one species (*P. liebmanni*, var. *gassiesi*) that the erosion commences with several small, circular, isolated spots. It is also possible that one individual gnaws at the shell of another in order to obtain calcareous matter for its own growth, as has been observed in land-shells by Rossmässler. The upper whorls seem to become gradually filled inside with calcareous matter, so that, in spite of extensive erosion, they form a solid conical prominence in some species, *e. g.* in *P. turatii*. On account of this loss of the upper whorls it is very often impossible to do more than give the number of those remaining ("anfractus superstites"); and, for the same reason, the relative proportion of the diameter of the shell to its length is of no great value for the discrimination of the species, being variable in different individuals according to the extent of erosion. The relative proportion of the diameter of the whole shell (last whorl in its greatest breadth) to the length of the aperture is, however, of some importance, as it indicates a real difference in the conformation of the shell.

The species of the subgenus *Oxymelania* are the least subject to this erosion.

The number of remaining whorls in the adult state is, of course, somewhat variable, but nevertheless I shall mention it in the Comparative Table, as it is of some use in distinguishing the various forms.

As all the *Pachychili* show faint spiral striæ in their sculpture, I have not mentioned this in the Table, using the term "lævis" for all the parts which are without distinctly elevated spiral lines (liræ); the broader elevations running from above to below, from

one suture to the other, or to the base of the shell, crossing the spiral lines, are here termed vertical plaits (plicæ verticales).

Some of the species are used as food by the natives of Guatemala, according to Morelet and Bocourt (*cf.* Fischer and Crosse, *loc. cit.* p. 331); and this observation has been confirmed by Mr. Champion. They are known to the Indians by the name of "jutes."

The genus *Pachychilus* is confined to Central America and the northern parts of South America; in the West-Indian Islands it is represented in Cuba only, and there by smaller and somewhat aberrant forms, *P. conicus*, d'Orb., near *P. schiedeanus*, and *P.* (*Potamanax*) *brevis*, d'Orb. It is clearly nearer to the genus *Melania* of the Old World than to the North-American Strepomatidæ.

Fischer and Crosse have grouped the species under four subgenera, characterized by obvious features in the general shape of the shell; but there are several forms which are somewhat intermediate between the one and the other. *Potamanax*, Pilsbry, may be added as another subgenus, distinguished by a difference in the form of the aperture and perhaps also in that of the operculum.

The geographical distribution of the species in Mexico and Central America is given in the Table on the following pages.

A. Subgen. Glyptomelania.

Glyptomelania, Fischer & Crosse, Miss. Scient. Mex., Moll. ii. pp. 328, 351 (1892).

Turrite, with more developed sculpture; outer margin of the aperture simple. Most of the species of rather large size.

1. **Pachychilus glaphyrus.**

Melania immanis (Morelet, 1851), Brot, in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, Melaniaceen, pp. 19–23, t. 2. figg. 1 *a–g* [1].

Pachychilus glaphyrus (Morelet, 1849), Fisch. & Crosse, Miss. Scient. Mex., Moll. ii. pp. 350–357, t. 52. figg. 1, 2, & t. 53. figg. 1–4 [2].

Brot, Fischer and Crosse include all the forms of this very variable species under *M. immanis* or *P. glaphyrus*, the latter name having been first used by Morelet in 1849 for a comparatively small, not very typical shell, though it is applicable also (γλαφυρὸς, in Greek, "carved") to the largest and most developed forms.

The numerous varieties are known by different names, and they are here dealt with separately.

a. Var. *immanis*.

Melania immanis, Morelet, Test. Noviss. ii. p. 22 (1851) [3]; Reeve, Conch. Icon. xii., *Melania*, t. 35. fig. 238 [4].

Melania immanis, a. *typica*, Brot, in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, Melaniaceen, p. 20, t. 2. fig. 1 *a* [5].

	Glyptomelania.	Pachychilus, s. str.	Oxymelania.	Potamanax.
Central Mexico	*pluristriatus.*	.....	?*schiedeanus, saussurei.*	
East Mexico ..... (Vera Cruz.)	.....	*liebmanni, turatii, apis, indiorum.*	*schiedeanus,* with var. *strebelianus.*	
S.W. Mexico	.....	*dalli.*		
South-east Mexico .. (Tabasco, Chiapas.)	*glaphyrus,* varr. *polygonatus, glaphyrus, pyramidalis, potamarchus.*	*liebmanni,* var. *gracilior; indiorum,* with varr. *costato-plicatus* and *varicosus; chrysalis, panucula, corvinus.*	.....	*pilsbryi.*
N. Guatemala .... (Peten, Vera Paz.)	*glaphyrus,* varr. *immanis, polygonatus, scamnatus, glaphyrus, glaphyroides, semilævis, opiparis, pyramidalis; obeliscus,* var. *pyrgiscus; largillierti,* with var. *salvini.*	*indiorum,* var. *costato-plicatus; panucula,* with var. *tumidus; cinereus; explicatus; corvinus,* with varr. *lutescens* and *indifferens.*	*graphium,* with var. *reductus.*	*sargi.*
Centr. Guatemala ..	.....	.....	*graphium,* with var. *transcendens.*	
East Guatemala .... (Polochic, Yzabal.)	*glaphyrus,* var. *pyramidalis; lacustris,* with varr.; *largillierti,* with var. *salvini.*	?*örstedi,* var. *planensis; corvinus,* var. *indifferens.*		
W. Guatemala .... (Pacific slope.)	*largillierti,* with varr. *nodulosus, salvini,* and *stolli.*	*corvinus.*		
Honduras	*obeliscus.*	*örstedi,* var. *planensis.*		
Salvador	*largillierti.*	*chrysalis,* var. *nympha.*		
Centr. Nicaragua ..	*subnodosus, largillierti.*			
East Nicaragua	.....	*örstedi.*		
Costa Rica	*subnodosus.*	*örstedi.*		

Comparative Table of the Species of *Pachychilus*.

Nomen.	Figura.	Sculptura.	Anfractus superstites.	Basis anfr. ult.	Long.	Diam.	Apert. long.	Patria.
Subgen. Glyptomelania. glaphyrus, *F. & Cr.*, var. immanis, *Morel.*	conico-turrita, megastoma.	verticaliter plicata, anfr. inff. cingulis spir. nodosis 1–3.	plani, 8–10, penult. et ult. anguloso-tumidi.	liris spir. distinctis, validis, numerosis.	mm. 80–103	mm. 34–40	mm. 29½–32	N. Guatemala.
——, var. polygonatus, *Lea.*	,,	plicis verticalibus in anfr. inff. persistentibus.	,,	,,	67–70	29–32	21–27	S.E. Mexico, N. Guatemala.
——, scamnatus, *F. & Cr.* ...	,,	plicis vert. et cingulis spir. 3–4 in anfr. inff.	10, penult. et ult. subtumidi.	,,	68	31	25	N. Guatemala.
——, s. str.	subcylindrico-turrita.	plicis vert. in anfr. ult. persistentibus, liris spir. 6–7.	8–10, subtumidi, ult. medio angulatus.	,,	63–71	20–27	22–24	S.E. Mexico, N. Guatemala.
——, var. glaphyroides, *F. & Cr.*	conico-turrita.	plicis vert. debilioribus, liris 3–4 interruptis.	ultimus subtumidus.	,,	53–54	20–21	18	N. Guatemala.
——, var. semilævis, *F. & Cr.*	,,	plicis vert. debilibus, in anfr. supp. nullis.	plani, ult. angulatus.	,,	70–75	30–33	30–31	N. Guatemala.
——, var. opiparis, *Morel.* ...	,,	plicis vert. subnullis, liris spir. distinctis.	plani, 7–8, ult. subtumidus.	,,	73–75	28–31	29–30	N. Guatemala.
——, var. pyramidalis, *Morel.*	conico-turrita, superne attenuata.	plicis vert. nullis, liris spir. supra basin subnullis.	plani, 10–11, ult. subtumidus.	,,	72–85	24–30	23–29	S.E. Mexico, N. & E. Guatemala.
——, var. potamarchus, *Pilsbr.*	,,	plic. vert. et liris spir. nullis.	,,	liris spir. nullis.	87–99	29–33	32	S.E. Mexico.
obeliscus, *Reeve*.....	elongato-turrita, microstoma.	anfr. ult. nodis depressis, c. 8, liris spir. obsoletis.	declives, imbricati, 8–10.	liris sp. validis.	72–78	27–28½	21–23½	Honduras.
——, var. pyrgiscus, *F. & Cr.*	,,	anfr. ult. cingulo multinoduloso et liris spir. distinctis.	,,	liris sp. distinctis.	57–69	20–27	18–23	N. Guatemala.
——, var. exarmatus, *F. & Cr.*	,,	anfr. ult. liris spir. distinctis, nodis nullis.	,,	liris sp. numerosis.	74	25	21	? Honduras.

lacustris, *Morel.*, s. str.	subcylindrico-turrita, microstoma.	plicis vert. et liris spir. distinctis.	plani, 8–10, penult. et ult. subtumidi.	liris spir. distinctis.	39–52	16–18½	13–17	E. Guatemala.
——, var. amphibolus, *F. & Cr.*	elongato-turrita.	plicis vert. debilibus, lira spirali una magis prominente.	penult. et ult. tumidi, angulato-nodulosi.	„	62	21	18	E. Guatemala.
——, var. conradti, *v. Mart.* .	„	plicis vert. nullis, liris spir. distinctis, una magis prominente.	subtumidi, læves.	liris spir. distinctis, c. 7.	50–54	18½–20	16½–19	E. Guatemala.
——, var. pumilus, *F. & Cr.* .	oblongo-turrita.	plicis vert. nullis, liris spiral. paucis, modicis.	subplani.	liris spir. distinctis, c. 6.	28	11	10	E. Guatemala.
——, var. major, *F. & Cr.* ...	conico-turrita.	plicis v. null., liris spir. æqualibus, interd. subnodulosis.	„	„	57–62	21	17–19	E. Guatemala.
——, var. terebralis, *F. & Cr.*	elongato-turrita.	plicis v. null., liris sp. debilibus.	penult. et ult. subtumidi.	„	62	17½	16½	E. Guatemala.
——, var. elimatus, *F. & Cr.* .	subcylindrica.	plicis v. 0, liris spir. obsoletis.	plani, ult. subtumidus.	„	44	15	14½	E. Guatemala.
pluristriatus, *Say*.....	turrito-conica.	æqualiter spiratim lirata.	8–11, ultimus tumidus, ad suturam instrictus.	liris sp. minoribus numerosis.	26–31	12–14	11–13	Centr. Mexico.
subnodosus, *Phil.*	conico-turrita, marg. columellari perobliquo.	plicis vert. paucis obsoletis; parce spiratim lirata.	plani, 8, ult. subtumidus.	spiratim lirata.	46–53	19–20	14–17	Centr. Nicaragua, Costa Rica.
largillierti, *Phil.*	elongato-turrita.	irregulariter et obsolete subplicata et striatula.	subtumidi, 10–11, ult. tumidus, subangulatus.	„	47–60	19–22½	18½–21	N., E., & W. Guatemala, Salvador, Centr. Nicaragua.
——, var. nodulosus, *v. Mart.*	„	serie nodulorum peripherica.	„	„	60	24	22	W. Guatemala.
——, var. salvini, *Tristr.*.....	conico-turrita.	„	subplani, 5–11, ult. subtumidus.	„	49	19	20	N., E., & W. Guatemala.
——, var. stolli, *v. Mart.* ...	subcylindrico-turrita.	obsolete spiratim striata.	subplani, 4–5, ult. tumidus, sutura impressa.	liris obsoletis, latiusculis.	26–30	12–13	10–11	W. Guatemala.
PACHYCHILUS, s. str.								
liebmanni, *Phil.*	conico-turrita.	lævis.	subplani, 4½–5, ult. vix convexiusculus.	sublævis.	39–40	17–18	18–19	E. Mexico.

COMPARATIVE TABLE OF THE SPECIES OF *PACHYCHILUS* (*continued*).

Nomen.	Figura.	Sculptura.	Anfractus superstites.	Basis anfr. ult.	Long.	Diam.	Apert. long.	Patria.
liebmanni, var. gracilior, *v. Mart.*	elongate subcylindrico-turrita.	lævis.	subplani, 4½–5, ult. vix convexiusculus.	sublævis.	mm. 31–42	mm. 14½–17	mm. 14–16	S.E. Mexico.
——, var. gassiesi, *Reeve*.....	,,	,,	subplani, 3–4, ult. subtumidus.	,,	38	17–18	15–16	"Centr. America."
turatii, *Villa*	ovato-turrita, apice acuto.	leviter vert. striata.	sat tumidi, 6–7.	,,	36–46	17–20	16–20	E. Mexico.
apis, *Lea*	turrito-ovata.	"striata, obscure granosa, lineis paucis elevatis."	tumidi, angulati, 6–7.	?	20	7½–10	9½	E. Mexico.
indiorum, *Morel.*	acute conico-turrita, marmorata, apice plerumque integro.	lævis.	subplani, 8–9, ult. paulum convexus.	lævis.	53–61	23–28	24	E. & S.E. Mexico.
——, var. costato-plicatus, *Brot.*	,,	plicis vert. irregularibus sparsis.	subplani, 8, ult. convexus, subangulatus.	,,	50–69	23–24	20–22	S.E. Mexico, N. Guatemala.
——, var. varicosus, *F. & Cr.*	,,	plicis vert. validis, latis, spir. liratis.	subplani 8, ult. convexus.	,,	52–53	21–22	21–22	S.E. Mexico.
——, var. radix, *Brot.*	clavato-turrita.	lævis.	subplani, 9½, ult. subglobosus.	,,	42	18	16	?
dalli, *Pilsbr.*	acute ovato-turrita, peristom. extus bisinuato.	,,	subplani, 6–7, ult. convexus.	,,	52–54	25–27	24	S.W. Mexico.
chrysalis, *Brot.*	oblonga, anfr. penult. alto.	,,	subplani, 4½–8, ult. subcylindricus.	,,	45–52 (60)	20–26	20–26	S.E. Mexico.
——, var. nympha, *v. Mart.*.	,,	,,	subplani, 8.	,,	34–36	17–18	15–16½	Salvador.
panucula, *Morel.*	conico-turrita.	,,	subplani, 8, ult. paullum convexus.	,,	45–48	17–21	20–21	S.E. Mexico, N. Guatemala.
——, var. mexicanus, *Reeve*...	obese conica, basi minus convexa.	,,	subplani, 4–5, ult. convexus.	,,	46	26	23½	Mexico.
——, var. tumidus, *Tristr.* ...	conico-turrita, basi tumida.	,,	subplani, 7–8, ult. basi tumidus.	,,	64–65	28–32	23–25½	N. Guatemala.
örstedi, *Mörch*	subfusiformi-turrita, marg. colum. valde arcuato.	,,	subplani, 3–6, ult. sat convexus.	,,	32–36	16	19	E. Nicaragua, ? Costa Rica.

——, var. planensis, *Lea*.....	fusiformi - turrita, marg. colum. magis obliquo.	„	„	„	71	28	28	Honduras.
cinereus, *Morel.*	conico-turrita, cinerea.	„	subplani, 10, ult. paulum convexus.	„	32–35	13–15	13	N. Guatemala.
explicatus, *F. & Cr.*	conico-turrita, variegata.	„	subplani, 8–10, ult. parum convexus.	„	42	17	14	N. Guatemala.
corvinus, *Morel.*	oblongo-conica, castanea vel nigricans.	„	subplani, 6–7, ult. sat convexus.	„	22–39	12–20	10–19	S.E. Mexico, N. & W. Guatemala.
——, var. lutescens, *F. & Cr.*	obese oblongo-conica, pallide brunnea.	„	„	„	33	19	16½	N. Guatemala.
——, var. indifferens, *Cr. & F.*	conico-turrita, subangulata, flammulata.	„	subplani, 6½, ult. modice convexus.	„	23	10	10	N. & E. Guatemala.
Subgen. Oxymelania.								
graphium, *Morel.*	lanceolato - turrita, apice integro, peristomate crasso.	lævis, nitidula.	subconvexi, 10, ult. sat convexus.	lævis.	26–31	10–12	9½–11	N. & Centr. Guatemala.
——, var. reductus, *F. & Cr.*.	„	malleata, liris spir. irregularibus.	„	„	31	12	11	N. Guatemala.
——, var. transcendens, *F. & Cr.*	obese lanceolata.	obsolete spir. lirata.	subconvexi, 9.	„	36–38	14–16	15	Centr. Guatemala.
schiedeanus, *Phil.*	subulato-turrita, apice integro, peristomate crasso.	vert. striatula, nitidula.	paullum convexi, 8–10.	„	22–31	8–12	6½–11	E. & ? Centr. Mexico.
——, var. strebelianus, *F. & Cr.*	subconico - turrita, perist. tenui.	subdecussata.	sat convexi, 6.	liris spir. 1–2.	24–25	10–12	9–9½	E. Mexico.
saussurei, *Brot*	elongato-turrita, apice integro.	granulis triseriatis infra suturam.	paullum convexi, 10–11.	?	20	9	8	Centr. Mexico.
Subgen. Potamanax.								
sargi, *Cr. & F.*	ovato-conica, apertura basi rotundata, marg. colum. calloso.	lævis.	subplani, 5, ult. convexus, subangulatus.	lævis.	16–19	10–11	9–10	N. Guatemala.
pilsbryi, *v. Mart.*	ovato-oblonga, apertura basi rotundata, marg. colum. calloso.	spiratim lirata.	leviter convexi, 5, ult. rotundatus.	?	16½–20	9½–12	8	S.E. Mexico.

Melania glaphyra, Hanley, Conch. Miscell., *Melania*, t. 2. fig. 17 [6].
Pachychilus glaphyrus, var. γ. *immanis*, Fisch. & Crosse, loc. cit. p. 351, t. 53. figg. 1, 1 *a* [7].
? *Melania maxima*, Lea, P. Z. S. 1850, p. 187 [8].

One, two, or three strong, knobbed, spiral keels on the last-formed whorls (the terminal and the second and third from the end); vertical plaits stronger on the first-formed whorls, nearly vanishing on the later ones. Attains a very large size: long. 80–103, diam. 34–40; apert. long. 29½–32 millim.

Hab. N. Guatemala: in small streams in the Province of Peten (*Morelet* [3]); Dolores (*Morelet* [7]); Coban * [8]; Rio Jacinto at Punta Gorda (*v. Ihering, in litt.*).

The variety of *P. glaphyrus* figured by Pilsbry (Proc. Acad. Phil. 1892, p. 339, t. 10. fig. 6), from Tabasco, is very near this form, but of smaller size and wants the spiral ridges at the base, as in var. *i* from the same locality.

b. Var. *polygonatus*.

Melania polygonata, Lea, P. Z. S. 1850, p. 195 [9]; Reeve, Conch. Icon. xii., *Melania*, t. 3. fig. 11 [10].
Pachychilus glaphyrus, var. β. *polygonata*, Fisch. & Crosse, loc. cit. p. 351 [11].
Pachychilus (*polygonatus*, var. ?) *rovirosai*, Pilsbry, Proc. Acad. Phil. 1892, p. 153, t. 8. fig. 10 [12].

Vertical plaits strong, extending to the last-formed whorl, rather distant, 8–9 on each whorl; spiral ridges rather fine, strong only on the base of the last whorl. Long. 67–70, diam. 29–31; apert. long. 21–26 millim.

Hab. S.E. Mexico: western brow of the little ridge of the Limon, State of Tabasco (*Rovirosa* [12]).

N. Guatemala: Coban * [9] (*Conradt, in Mus. Berol.*); Dolores (*Morelet* [11]).

c. Var. *scamnatus*.

Pachychilus glaphyrus, var. δ. *scamnata*, Fisch. & Crosse, loc. cit. p. 352, t. 52. fig. 2 [13].

Near the preceding, but with the vertical plaits crossed by 3–4 elevated spiral ridges. Long. 68, diam. 31; apert. long. 25 millim.

Hab. N. Guatemala: Coban (*Bocourt* [13]).

d. glaphyrus, s. strict.

Melania glaphyra, Morelet, Test. Noviss. i. p. 24 (1849) [14]; Reeve, Conch. Icon. xii., *Melania*, t. 2. fig. 8 [15].
Pachychilus glaphyrus, var. α. *glaphyra*, Fisch. & Crosse, loc. cit. p. 352, t. 52. fig. 2 *a* [16].
Pachychilus glaphyrus, var., Pilsbry, Proc. Acad. Philad. 1892, p. 339, t. 14. fig. 5 [17].

More cylindrical; vertical plaits strong, persistent, crossed by 6–7 elevated ridges; last whorl angulated in the continuation of the suture. Long. 63–71, diam. 20–27; long. apert. 22–24 millim.

Hab. S.E. Mexico: State of Tabasco (*Rovirosa* [17]).

N. Guatemala: at the springs of the River Usumacinta (*Morelet* [16]); Province of Peten, in small streams (*Bocourt* [16]).

e. Var. *glaphyroides*.

Melania immanis, var. ε, Brot, loc. cit. p. 22, t. 2. fig. 1 *f* [18].
Pachychilus glaphyrus, var. ε. *glaphyroides*, Fisch. & Crosse, loc. cit. p. 352 [19].

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* The locality given by Lea [8 9] is "Copan, Central America": probably Coban is intended.

Near the preceding; vertical plaits less developed, 3–4 interrupted elevated spiral lines on the upper half of each whorl. Long. 53–54, diam. 20–21; apert. long. 18 millim.

Hab. N. GUATEMALA: springs of the River Usumacinta (*Morelet* [19]).

f. Var. *semilævis.*

Melania immanis, var. *β*, Brot. loc. cit. p. 21, t. 2. fig. 1 *b* [20].
Pachychilus glaphyrus, var. *ζ. semilævis*, Fisch. & Crosse, loc. cit. p. 352, t. 53. figg. 2, 2 *a* [21].

Rather conical; whorls evenly sloping in profile, angulated in the suture or its continuation; vertical plaits weak, wanting in the upper whorls. Long. 70–75, diam. 30–33; apert. long. 30–31 millim.

Hab. N. GUATEMALA; Dolores, Province of Peten (*Morelet* [21]).

Specimens from Rio Chajmayu, in Alta Vera Paz, noted by H. v. Ihering as *P. opiparis*, with rufous-brown periostracum and numerous subvaricose thickenings, probably belong to this variety.

g. Var. *opiparis.*

Melania opiparis, Morelet, Test. Noviss. ii. p. 23 (1851) [22].
Melania pyramidalis (Morelet), Reeve, Conch. Icon. xii., *Melania*, t. 5. fig. 25 [23].
Melania immanis, var. *γ*, Brot, loc. cit. p. 21, t. 2. fig. 1 *c* [24].
Pachychilus glaphyrus, var. *θ. opiparis*, Fisch. & Crosse, loc. cit. p. 353, t. 53. fig. 3 [25].

Conico-turrite; vertical plaits nearly or quite absent; spiral ridges also on the whorls above the sutural line, at least on the last two whorls. Long. 73–75, diam. 28–31; apert. long. 29–30.

Hab. N. GUATEMALA: Dolores, Province of Peten, in small streams (*Morelet* [22 25]).

The words *opiparus* and *opiparis*, in Latin, mean "ample," "copious."

h. Var. *pyramidalis.* (Tab. XXV. figg. 2, 3.)

Melania pyramidalis, Morelet, Test. Noviss. i. p. 25 (1849) [26]; Hanley, Conch. Miscell. t. 4. fig. 31 [27].
Melania opiparis (Morelet), Reeve, Conch. Icon. xii., *Melania*, t. 35. fig. 241 [28].
Melanoides godmani, Tristram, P. Z. S. 1863, p. 113 [29].
Melania godmani, Brot, loc. cit. p. 25 [30].
Pachychilus godmani, Fisch. & Crosse, loc. cit. p. 363 [31].
Melania immanis, var. δ, Brot, loc. cit. p. 21, t. 2. figg. 1 *d*, *e* [32].
Pachychilus glaphyrus, var. *η*, Fisch. & Crosse, loc. cit. p. 353, t. 52. figg. 1, 1 *a* [33].
Pachychilus glaphyrus, var. *θ* (part.), Fisch. & Crosse, loc. cit. p. 353, t. 53. fig. 4 [34].
Pachychilus polygonatus, var. *rovirosai*, Pilsbry, Proc. Acad. Phil. 1892, p. 153, t. 8. fig. 9 (part.) [35].

More slenderly turrite; vertical plaits absent; spiral ridges confined to the base of the last whorl, or only a few above the sutural line on the last two whorls.

a.	Long.	85,	diam.	30;	apert. long.	29	millim.	(Brot, fig. 1 *d*).
b.	„	85,	„	29;	„	26	„	(Brot, fig. 1 *e*).
c.	„	84,	„	28;	„	24	„	(Hanley, fig. 31).
d.	„	80,	„	26;	„	28	„	(Morelet).
e.	„	80,	„	25;	„	28	„	(specimen collected by Stoll).
f.	„	75,	„	28;	„	23	„	(Fisch. & Crosse, fig. 1).
g.	„	72,	„	27;	„	25	„	(Fisch. & Crosse, fig. 4).
h.	„	72,	„	24;	„	23	„	(specimen in Dunker's coll.).

i. Long. 57, diam. 22½; apert. long. 21 millim.
k. „ 53, „ 20; „ 21 „
l. „ 51, „ 21; „ 19 „
m. „ 48, „ 22; „ 19 „
n. „ 47, „ 19; „ 18½ „
o. „ 36, „ 17; „ 16 „
p. „ 30, „ 14; „ 13 „
} (specimens collected by Conradt at Panzos).

Two of the specimens from Panzos, *n* and *o*, are distinctly not full-grown. It appears from these measurements that the length of the aperture is usually, but not always, a little less than the greatest diameter of the shell. For very young shells, see Tab. XXV. figg. 2, 3.

Hab. S.E. Mexico: interior of the State of Tabasco, in small streams (*Morelet* [26]); little ridge of the Limon, State of Tabasco, in a spring (*Rovirosa* [35]).

N. Guatemala: Coban (*Bocourt* [33]); San Luis, Peten (*Rockstroh, ex Stoll*); Lake of Peten (*Salvin* [29]).

E. Guatemala: Panzos, Polochic Valley (*Conradt*); Rio Biafra, one of the affluents of the Rio Motagua (*v. Ihering, in litt.*).

This and the preceding variety run very much one into the other.

Through the kindness of Canon Tristram, I have been enabled to examine the Melaniadæ enumerated by him in the 'Proceedings of the Zoological Society of London' for 1863, and to satisfy myself concerning the identity of *M. godmani* with *P. pyramidalis*.

i. Var. *potamarchus*.

Pachychilus potamarchus, Pilsbry, Proc. Acad. Phil. 1892, p. 340, t. 14. fig. 7 [36].

Vertical plaits and spiral ridges absent, the latter wanting even on the base of the last whorl. Long. 87–99, diam. 29–33; apert. long. 32 millim.

Hab. S.E. Mexico: Tabasco (*Rovirosa* [36]).

The shell figured by Pilsbry, *loc. cit.* t. 8. fig. 9, also wants the vertical plaits as well as the spiral ridges, and would seem therefore to belong to this variety; but in size and general form it is more like the var. *pyramidalis*, in company with which it was found.

2. Pachychilus obeliscus.

Melania obeliscus, Reeve, Conch. Icon. xii., *Melania*, t. 4. fig. 20 (1859) [1]; Brot, in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, *Melania*, p. 24, t. 3. fig. 1 *a* [2].

Pachychilus obeliscus, Fisch. & Crosse, Miss. Scient. Mex., Moll. ii. p. 358 [3].

Somewhat intermediate between *P. glaphyrus* and *P. lacustris*, but distinct by its slender, elongate form, with the most prominent portion of each whorl a little above the suture, the whole shell being shaped like a pagoda, and resembling that of various species of *Turritella*, e. g. *T. duplicata*, L., and *T. imbricata*, L. In the typical form this prominent portion is broken up into about eight strong compressed knobs in the last two whorls, and the spiral ridges are here few and not very conspicuous.

Hab. Honduras (*Dyson* [1]).

Var. *pyrgiscus.* (Tab. XXV. fig. 6.)

Melanoides obeliscus, Tristram, P. Z. S. 1863, p. 413 [4].

Melania obeliscus, var. *β,* Brot, loc. cit. p. 24 [5].

Pachychilus obeliscus, var. *β. pyrgiscus,* Fisch. & Crosse, loc. cit. p. 358, t. 50. figg. 9 *a, b* [6].

Prominent portion of the whorls broken up into more numerous (about twelve) smaller knobs; spiral ridges on the last whorl also well developed. Two specimens collected by the late O. Salvin are remarbably larger in size than those mentioned by Fischer and Crosse, viz.: long. 69, diam. 27; apert. long. 23, diam. 14–15 millim.

Hab. N. GUATEMALA: Lake of Peten (*Salvin* [4]).

Fischer and Crosse give no definite locality for this variety.

Var. *exarmatus.*

Melania obeliscus, var. *γ,* Brot, loc. cit. p. 24, t. 3. fig. 1 *b* [7].

Pachychilus obeliscus, var. *γ. exarmata,* Fisch. & Crosse, loc. cit. p. 358 [8].

Prominent portion of the last two whorls without knobs; spiral ridges strongly developed.

Hab. ? HONDURAS.

The habitat of this form is not expressly stated. According to Brot, the varieties are connected by intermediate examples.

3. Pachychilus lacustris.

Melania lacustris, Morelet, Test. Noviss. i. p. 25 (1849) [1]; Brot, in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, Melaniaceen, p. 25 [2].

Pachychilus lacustris (Morelet), Fisch. & Crosse, Miss. Scient. Mex., Moll. ii. pp. 358–362 [3].

Fischer and Crosse are right in observing that *P. lacustris* forms a polymorphous series analogous to that of *P. glaphyrus*; but I think *P. obeliscus* ought also to be included, the *P. lacustris* varr. *amphibolus* and *terebralis* of those authors being indeed not separable from *P. obeliscus.*

a. lacustris, s. str.

Pachychilus lacustris (Morelet), Fisch. & Crosse, loc. cit. p. 359, t. 52. figg. 4, 4 *a,* and t. 51. figg. 3, 3 *a* [4].

Vertical plaits and spiral ridges developed. Shell moderate in size. Long. 39–52, diam. 16–18½; apert. long. 13–17 millim.

Hab. E. GUATEMALA: lake near the town of Yzabal (*Morelet* [1 2]); Lake of Yzabal (*Bocourt* [3 4]); Panzos (*Conradt, in Mus. Berol.*).

b. Var. *amphibolus.* (Tab. XXV. fig. 7.)

Pachychilus lacustris, var. *ζ. amphibola,* Fisch. & Crosse, loc. cit. p. 360, t. 52. fig. 3 [5].

Vertical plaits rather feeble; one of the spiral ridges more prominent, forming a knobbed keel on the last two whorls somewhat beneath the sutural line.

Long. 62, diam. 21; apert. long. 18 millim. Whorls 9 (Fisch. & Crosse).
„ 60, „ 23; „ 21 „ Whorls 8 (specim. Stoll).

Hab. E. Guatemala: Lake of Yzabal and neighbouring streams (*Morelet* or *Bocourt* [5]); near the town of Yzabal, on the banks of the same lake (*Stoll*).

This form is very near *P. obeliscus*, var. *pyrgiscus*, Fisch. & Cr., but differs from it in having deeper sutures, more convex whorls, and less distinct vertical plaits, especially in the last whorl. Stoll's specimen is extremely like it.

c. Var. *conradti*, n. (Tab. XXV. figg. 9, 10.)

Vertical plaits undeveloped; spiral ridges well developed, one a little more prominent and slightly nodose. Shell moderate in size.

Long. 54, diam. 20; apert. long. 19 millim. Whorls $7\frac{1}{2}$ (Conradt).
„ 50, „ $18\frac{1}{2}$; „ $16\frac{1}{2}$ „ Whorls $7\frac{1}{2}$ (Stoll).

Hab. E. Guatemala: Panzos (*Conradt, in Mus. Berol.*); Lake of Yzabal (*Stoll*).

d. Var. *pumilus*.

Pachychilus lacustris, var. δ. *pumila*, Fisch. & Crosse, loc. cit. p. 360, t. 51. figg. 4, 4 *a* [6].

Vertical plaits undeveloped; spiral ridges moderately developed, few in number. Shell small. Long. 28, diam. 11; apert. long. 10 millim.

Hab. E. Guatemala: Lake of Yzabal or neighbouring streams (*Morelet* or *Bocourt* [6]); Panzos (*Conradt, in Mus. Berol.*).

e. Var. *major*. (Tab. XXV. fig. 8.)

Melania lacustris, Hanley, Conch. Miscell., *Melania*, t. 3. fig. 26 [7].
Melania lacustris, var. α, Brot, loc. cit. p. 26, t. 3. fig. 2 *a* [8].
Pachychilus lacustris, var. β. *major*, Fisch. & Crosse, loc. cit. p. 360 [9].

Vertical plaits undeveloped; spiral ridges rather feeble, equal, sometimes slightly nodose. Long. 57–62, diam. 17–19; apert. long. 10 millim.

Hab. E. Guatemala: Lake of Yzabal (*Morelet*, *Stoll*).

f. Var. *terebralis*.

? *Melania murrea* (Reeve), Brot, loc. cit. p. 30 (part.), t. 3. fig. 7 *a* [10].
Pachychilus lacustris, var. η. *terebralis*, Fisch. & Crosse, loc. cit. p. 360, t. 52. fig. 3 *a* [11].

Very elongate, turrite; vertical plaits undeveloped; spiral ridges feeble, more distinct on the last whorl only. Long. 62, diam. $17\frac{1}{2}$; apert. long. $16\frac{1}{2}$ millim.

Hab. E. Guatemala: Lake of Yzabal or neighbouring streams (*Morelet* or *Bocourt* [11]).

g. Var. *elimatus*.

? *Melania subcarinata*, Gray in Griffith's Anim. Kingd. xii. t. 14 (ad p. 487). fig. 7 (1834) [12].
Melania lacustris, var. γ, Brot, loc. cit. p. 26, t. 3. fig. 2 *c* [13].
Pachychilus lacustris, var. ε. *elimata*, Fisch. & Crosse, loc. cit. p. 360 [14].

Subcylindrical; vertical plaits undeveloped; spiral ridges obsolete, almost wanting, save at the base of the last whorl. Long. 44, diam. 15; apert. long. $14\frac{1}{2}$ millim.

Hab. E. Guatemala: Panzos (*Conradt, in Mus. Berol.*).

Morelet [1] remarks of this species: "*M. lacustris* circa pagum Yzabal," which leaves it uncertain whether his specimens were from the great lake only or from other waters near it. Fischer and Crosse [3] give no special indications of localities for their different varieties, but merely say generally: "Le type et les variétés proviennent du lac Yzabal et des cours d'eau voisins" (*loc. cit.* p. 362). Herr Conradt has given to the Berlin Museum the following forms from Panzos:—*lacustris*, sens. strict.; var. *conradti*; a specimen intermediate between the varr. *major* and *elimatus*; and, finally, the var. *pumilus*. Panzos is situated in the valley of the Polochic river, which drains into the Lake of Yzabal. All his specimens are of a shining black colour.

Brot's var. β, t. 3. fig. 2 *b*, = Fischer and Crosse's var. γ. *extenuata*, is rather an imperfect much-worn specimen than a distinct variety.

4. **Pachychilus pluristriatus.** (Tab. XXVI. fig. 1.)

Melania pluristriata, Say, in New Harmony Disseminator of Useful Knowledge, Dec. 1831 [1]; Complete Writings, p. 140 [2]; Brot, in Martini & Chemnitz, Syst. Conch.-Cab., ed. 2, Melaniaceen, p. 44 [3].

Pachychilus pluristriatus, Fisch. & Crosse, Miss. Scient. Mex., Moll. ii. p. 370 [4].

Melania rubida, Lea, Proc. Acad. Phil. 1856, p. 145 [5]; Obs. Unionidæ, xi. p. 77, t. 22. fig. 16 (1864) [6]; Brot, loc. cit. p. 341, t. 34. fig. 2 [7] (copy from Lea).

Pachychilus rubidus, Fisch. & Crosse, loc. cit. p. 371 [8].

Melania labiosa, Wiegmann, in Mus. Berol. [9].

Conico-turrite, encircled with elevated, sharply defined, spiral ridges, of which six are visible on the penultimate whorl, five on the upper half of the last whorl, and 8–10 less distinct ones on the basal half of the latter; the ridges are not exactly equal—in one specimen, for instance, the second and fifth on the penultimate whorl are distinctly more feeble, in another the third is stronger than the rest; on the upper whorls the fourth is usually the most prominent. Preserved whorls eight, probably one or two only lost, almost even, apart from the prominent ridges, the sutures shallow; the last whorl divided from the preceding by a very deep suture and also more rounded, very convex below. The aperture occupies rather more than a third of the whole length of the shell; it is ovate, rounded above and distinctly produced below; the outer margin is simple, rounded; the columellar margin is much thickened, smooth, and glossy. The specimens before me from the Laguna of Chapala are quite bleached, whitish; Say gives the colour as reddish (rufescens), and according to Lea it is rusty (ferruginea).

a. Long. 35, diam. 13; apert. long. 13, diam. $9\frac{1}{2}$ millim.
b. „ 26, „ 12; „ 11, „ 8 „
c. „ 33, „ 13; „ 13, „ 10 „
d. „ 31, „ 14.

a, *b*. Dimensions of the specimens in the Berlin Museum; *c*, as shown in Lea's figure; *d*, as given by Say ($1\frac{1}{4}$ and $\frac{11}{20}$ inch).

Hab. CENTRAL MEXICO: Laguna de Chapala, in the district of Guadalajara, western part of the Mexican plateau (*Deppe* [9]); Mexico, without nearer indication of locality (*Say* [1–3]); Mexico, probably from the central plateau (*Hon. J. R. Poinsett* [5–8]).

This is the only known species of Melaniidæ which is peculiar to the tableland of Mexico, and I am even not sure whether it is still living or extinct: Deppe's specimen

in the Berlin Museum has somewhat the appearance of a fossil shell, and the reddish or rusty colour noticed by Say and Lea seems to indicate that their examples also were not in a fresh state.

My description and figure are taken from Deppe's specimen, called *Melania labiosa* by Wiegmann, which, according to Brot, is identical with *M. rubida*, Lea, although this last-mentioned author says nothing of the spiral ridges, these being, however, distinctly visible in his figure. *M. pluristriata*, Say, seems to me, from the description, to belong to the same species.

5. **Pachychilus subnodosus.** (Tab. XXV. figg. 11, 13.)

Melania subnodosa, Philippi, Abbild. neuer Conch. ii. p. 173, t. 4. fig. 18 (Feb. 1847) [1]; Brot, in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, Melaniaceen, p. 29, t. 3. fig. 5 [2].

Pachychilus subnodosus, Fisch. & Crosse, Miss. Scient. Mex., Moll. ii. p. 366 [3].

Near *P. largillierti*, the last two whorls more convex than the preceding, with some spiral ridges. Columellar margin very oblique, less descending than in the other species of the genus. Colour yellowish-brown.

Hab. Central Nicaragua: Managua (*Rothschuh, in Mus. Berol.*).

Costa Rica, without nearer indication of locality (*van Patten, in Mus. Berol.*).

Very near *P. lacustris*, and also varying in a similar manner, but broader, each whorl broader compared to its height than in *P. lacustris*. The obliquity of the columellar margin is very striking in some specimens, as shown in Brot's figure [2] and in our example from Managua, but this is less noticeable in Philippi's original figure [1] and in our specimen from Costa Rica.

The recorded localities for this species are rather vague: Philippi [1] gives "Central America," and Brot [2], on the authority of Sowerby, "Guatemala," which is doubted by Fischer and Crosse [3]. The Berlin Museum, many years ago, received a specimen of it with other Costa Rican shells from Mr. Van Patten, as having been found by himself in Costa Rica, but it has not been met with by either Pittier or Biolley.

6. **Pachychilus largillierti.** (Tab. XXV. fig. 12; Tab. XXVI. fig. 2.)

Melania largillierti, Philippi, Abbild. neuer Conch. i. p. 62, t. 2. fig. 10 (1843) [1]; Reeve, Conch. Icon. xii., *Melania*, t. 18. fig. 127 [2]; Brot, in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, Melaniaceen, p. 31, t. 4. figg. 1 *a*, *b*, *c* [3].

Pachychilus largillierti, Fisch. & Crosse, Miss. Scient. Mex., Moll. ii. p. 364, t. 52. figg. 5, 5 *a* [4].

Melania intermedia, Von dem Busch, in Philippi's Abbild. neuer Conch. i. p. 160, t. 3. fig. 4 (1844) [5]; Reeve, Conch. Icon. xii., *Melania*, t. 20. fig. 141 [6].

Melania rubicunda, Reeve, loc. cit. t. 31. fig. 206 (1860) [7].

Melania rusticula, Von dem Busch, in Malak. Blätt. 1858, p. 36 [8].

Melanoides glaphyra (Morelet), Tristram, P. Z. S. 1863, p. 413 [9].

Melania guatemalensis, Parreyss, in litt. [10]

Smooth on the greater part of the surface, but on the base of the last whorl several elevated ridges. Whorls somewhat convex, especially the last.

Hab. N. Guatemala: Rio de la Pasion (*Salvin* [9]).

E. Guatemala: Lagarto, near Zacapa (*Sallé* [4]).

W. Guatemala; Lake of Amatitlan, and in the Rio Michatoya, issuing from this lake (*Bocourt* [4]); Rio Maria Linda (*Morelet* [4]); Paso Antonio, near Torola, at lower part of the Rio Michatoya (*Stoll*); Mirandilla, near Escuintla, Pacific coast (*Stoll*).

Salvador: Joya [an Guija?] (*Sallé* [4]).

Central Nicaragua: Lake of Nicaragua (*Von dem Busch* [5 6]).

Also brought from Guatemala by Skinner [3] and others [10]. Bocourt [4] mentions too as a locality the Rio de las Vacas, the geographical situation of which is not known to me. Philippi [1] merely gives "Central America"; he received his specimens from Largilliert, a French conchologist. Salvin's Guatemalan specimen, identified by Canon Tristram [9] as *Melanoides glaphyra*, Morel., is now before me, and I am unable to distinguish it from *P. largillierti*.

P. indifferens, Fisch. & Crosse, Journ. de Conch. xxxi. p. 25 (1891), and Miss. Scient. Mex., Moll. ii. p. 337, t. 50. figg. 8, 8 *a–c*, from the Rio Motagua, E. Guatemala, looks very like young specimens of this species. *Melania lacunata*, Reeve, Conch. Icon. xii., *Melania*, t. 19. fig. 136 (copied by Brot, in Martini and Chemnitz, Syst. Conch.-Cab., ed. 2, Melaniaceen, p. 25, t. 3. fig. 4), locality unknown, is also perhaps one of the individual variations of *P. largillierti*.

In this species the last whorl is relatively lower, with regard to the whole length of the shell, than in *P. glaphyrus*, Fischer and Crosse, which gives it a distinct appearance, resembling a *Turritella*.

Var. *nodulosus*, n. (Tab. XXV. fig. 4.)

A row of small knobs in the circumference of the last whorl; the preceding whorls smooth. Long. 61, diam. 24; apert. long. 22 millim. Anfr. superst. 8.

Hab. W. Guatemala: Paso Antonio, in company with the normal form (*Stoll*).

The presence of small knobs on the shell in this variety indicates the affinity of *P. largillierti* with the sculptured species of *Pachychilus*, especially with *P. lacustris*; in all other respects the specimen agrees with typical *P. largillierti*.

Var. *salvini*. (Tab. XXVI. fig. 3.)

Melanoides salvini, Tristram, P. Z. S. 1863, p. 413 [11].

Melania salwini (sic), Brot, in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, Melaniaceen, p. 27 [12].

Mechychilus salvini, Fisch. & Crosse, Miss. Scient. Mex., Moll. ii. p. 362 [13].

Pachychilus subexaratus, Crosse & Fisch. Journ. de Conch. xxxix. p. 216 (1891) [14]; Miss. Scient. Mex., Moll. ii. p. 350, t. 52. fig. 6 [15].

Narrowly turrite, whorls flatter, the last not very convex; basal ridges distinct; several spiral ridges also on the upper half of the last whorl in some specimens.

a. Long. 63, diam. 17 (19); apert. long. 17, diam. 11 millim. Anfr. superst. 10–11.
b. „ 49, „ 19; „ 20, „ 11 „ „ 5.
a. One of Tristram's specimens measured by myself; *b*. Fischer and Crosse's measurements.

Hab. N. GUATEMALA; Rio de la Pasion, a tributary of the Usumacinta, in the Department of Alta Vera Paz (*Salvin* 11–13).
E. GUATEMALA: in small streams near the Lake of Yzabal (*Bocourt* 14 15).
W. GUATEMALA: Lake of Amatitlan (*Bocourt* 14 15).

Athough the localities are different and the measurements do not accord, yet on comparing Canon Tristram's specimens, kindly lent me by their possessor, with the figure given by Fischer and Crosse, I find they must be referred to the same variety of *P. largillierti*. The shell figured by the French authors is an older one and has lost more of its whorls than that measured by Canon Tristram and myself; it is thus absolutely shorter, but larger in periphery and in aperture. In one of Tristram's specimens spiral ridges are also present on the upper half of the last whorl, but not in the preceding ones; in the other example only at the base.

Var. *stolli*, n. (Tab. XXVI. figg. 5–9.)

Distinctly more cylindrical and of smaller size, ordinarily broadly truncated above, 4–5 whorls only remaining; these are feebly convex, with very fine spiral striæ, and more distinct, but irregular, scattered, vertical striæ, some of which are more prominent, ridge-like; suture distinctly impressed. Last whorl not more ventricose than the preceding, its largest diameter somewhat below the half of its height; base with several more or less distinctly prominent spiral ridges. Aperture comparatively small, scarcely produced below; columellar margin thickened, well arcuated. Surface of the shell dark greenish-brown or blackish, somewhat shining; columellar margin pale bluish, interior of the aperture dull greyish.

a. Long. 30, diam. 13; apert. long. 11, diam. 7 millim.
b. „ 26, „ 12; „ 10, „ 7 „

Hab. W. GUATEMALA: on the north-western slope of the Cordillera, in the environs of Retalhuleu (*Stoll*).

In its general shape this form somewhat resembles *P. liebmanni*, var. *gassiesi*. At first sight I was inclined to treat it as a distinct species; but the small size, the great decollation, and the repeated traces of stoppages of growth in the last whorl give it the appearance of a somewhat stunted form living under unfavourable conditions, analogous to the var. *irrigua* of *Melania libertina*, Gould, of Japan.

Melania murrea, Reeve, Conch. Icon, xii., *Melania*, t. 20. figg. 138 *a*, *b* (1860); Brot, in Martini and Chemnitz, Syst. Conch.-Cab. ed. 2, Melaniaceen, p. 30 (part.), t. 3. fig. 7 *b* (young), seems to be nearest this species, only the whorls are more even, the upper ones angulated near the suture, the last less rounded. Its locality is quite uncertain: Reeve merely says that it is "of the Central-American type."

B. Subgen. Pachychilus, s. str.

Sect. *Pachychilus*, s. strict., and *Cercimelania*, Fischer & Crosse, Miss. Scient. Mex., Moll. ii. pp. 327, 328, 340.

Conical-oblong, less elongate, smooth (*P. apis* excepted); last whorl comparatively large, upper whorls generally much eroded; peristome thick, simple.

The two subgenera proposed by Fischer and Crosse under the above names are best treated as one, as there is no important difference between them.

Κερκὶς, in Greek, the shuttle in the weaving-loom.

7. **Pachychilus liebmanni.** (Tab. XXVII. figg. 1, 2.)

Melania liebmanni, Philippi, Abbild. neuer Conch. iii. p. 58, t. 5. fig. 8 (1848) [1]; Reeve, Conch. Icon. xii., *Melania*, t. 20. fig. 139 [2]; Brot, in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, Melaniaceen, p. 48, t. 6. fig. 1 [3].

Pachychilus liebmanni, Fisch. & Crosse, Miss. Scient. Mex., Moll. ii. p. 347 [4].

Of rather oblong form and considerable size; whorls feebly convex, the upper ones generally much eroded, the apex thus being very blunt. Specimens with only four whorls left reach a length of 40 millim., diam. of their last whorl 18, aperture 19 high and 11 broad. Philippi's original figure measures: long. 39, diam. 17, length of aperture 18 millim.

Hab. E. Mexico: Playa Vicente, State of Vera Cruz (*Höge*); Mexico, without nearer indication of locality (*Liebmann* [1] [2]).

Brot [3] adds also "Tehuantepec" (*Geale*) as locality; it is uncertain, however, whether the Isthmus or the city of that name is intended.

Var. *gracilior*, n.

Melania gassiesi (Reeve), Gassies, Faune Conch. terr. et fluv. d'île Nouvelle Calédonie, i. p. 93 (1863) [5]; Brot, loc. cit. p. 47, t. 5. fig. 12 [6].

Pachychilus gassiesi, Fisch. & Crosse, loc. cit. p. 348, t. 51. fig. 5 [7].

Melania sallei, in litt. (*Brot*) [8].

Distinctly more slender than the typical *P. liebmanni*.

a. Long. 42, diam. 17; apert. long. 16 millim. (Brot). Anfr. superst. 4.
b. „ 31, „ 14½; „ 14 „ „ 3.

Hab. S.E. Mexico: Rio Teotalcingo, State of Oaxaca (*Sallé* [6] [7]).

Dr. Seler informs me that this river is situated in the North-eastern part of the State of Oaxaca, and that its waters enter the Rio Colorado, which discharges into the Rio Papaloapan, and therefore into the Atlantic; Teotalcingo is situated in the region of coffee-culture.

Var. *gassiesi.*

Melania gassiesi, Reeve, Conch. Icon. xii., *Melania*, t. 35. fig. 236 (1860) [9].

The length of the aperture distinctly less than the diameter of the last whorl. Long. 38, diam. 18; apert. long. 15 millim.

Hab. Central America [9].

8. **Pachychilus turatii.** (Tab. XXVI. figg. 10–20.)

Melania turati, Villa, in Strobel's Giornale di Malacologia, ii. p. 113 (1854) [1]; Notizie interno il genere Melania, p. 8 (Diario dell' Accademia Fisico-Medico e Statistico di Milano, 1855) [2]; Brot, Matériaux fam. Mélaniens, ii. p. 6, t. 3. figg. 11, 12 (1868) [3]; in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, Melaniaceen, p. 39, t. 5. figg. 2, 2 *a* [4].

Pachychilus turatii, Fisch. & Crosse, Miss. Scient. Mex., Moll. ii. p. 355, t. 51. figg. 1, 1 *a* [5].

Melania berendti, Dunker, in litt. (cit. Strebel, 1873) [6].

Melania gassiesi (Reeve), Strebel, Beitr. Mex. Land- und Süssw.-Conch. i. p. 37, t. 4. figg. 35, 35 *a*, *b* [7].

Near *P. liebmanni*, but with the whorls a little more convex, the general form somewhat more conical, tapering upwards; the apex generally eroded, but nevertheless pointed, not broadly truncated, and white in colour.

Hab. E. Mexico: Rio Atoyac *, State of Vera Cruz, on stones (*Strebel* [7], *Höge*); Rio Jamapa, State of Vera Cruz (*Beadle* [3]); near Orizaba (*Botteri* [5]; *Berendt, in coll. Dunker* [6]); Jalapa and Cordova (*Höge*).

The brothers Villa received their specimens from Ernesto Turati, and give [1] St. Louis in Luigiana (Italian name of Louisiana) as locality. I have under examination a number of examples found by Höge in the River Atoyac, which greatly exceed the size originally indicated by Villa and Brot, and also somewhat that of Strebel's largest specimen, the largest of Höge's shells measuring long. 46, diam. 20; apert. long. 20, diam. 12 millim. The curious appearance of the eroded, pointed, white spire may be due to local influence, but a similar peculiarity is shown in Brot's figure 11 (which is said to have been drawn from an "authentic" specimen), as well as in the figures given by Strebel and Fischer and Crosse; it becomes therefore almost a specific character in comparison with the broadly decollated appearance of *P. liebmanni* and its var. *gassiesi*.

From a large number of specimens collected by Höge in the Atoyac river the most dissimilar give the following measurements:—

a.	Long.	51,	diam.	23;	apert. long.	20	millim.	Anfr. superst.	7.
b.	„	42,	„	22;	„	21	„	„	5.
c.	„	45,	„	16;	„	$18\frac{1}{2}$	„	„	9.
d.	„	45,	„	$17\frac{1}{2}$;	„	17	„	„	9.
e.	„	59,	„	19;	„	20	„	„	9.

* Dr. Seler informs me that the word "Atoyac" signifies, in the native language, "on the river," and that many localities bear this name: the best known is a station on the railway between Orizaba and Paso del Macho, below Cordova. This is the locality visited by H. H. Smith in 1888, and Strebel and Höge appear also to have collected at the same place.

f.	Long.	34,	diam.	15;	apert.	long.	13	millim.	Anfr. superst.	8.
g.	„	32,	„	14;	„	13	„	„	8.
h.	„	25,	„	13;	„	11	„	„	7.
i.	„	24,	„	11;	„	9½	„	„	8.
k.	„	22,	„	10½;	„	10	„	„	8.
l.	„	15,	„	8;	„	7½	„	„	8.
m.	„	14,	„	8;	„	7½	„	„	8.

a is a large but comparatively typical specimen; *b*, a very broad one; *c* and *d*, comparatively slender, more turrite forms, approaching *P. liebmanni*; *e* is a curious, rather abnormal form, very turrite, with narrow last whorl, and therefore also more narrow aperture (probably an abnormally formed shell, with the last two whorls descending more than in typical specimens, so that the preceding whorl is embraced to a less extent by the following, and each of the abnormal whorls gains in height (length) what it loses in breadth, and also the whole shell in the same manner: I have seen similar monstrosities in several genera of shells). *f–k* are not full-grown shells, and among these some (*f*, *h*, *k*) are comparatively broader, others (*g* and *i*) narrower. The two youngest, *l* and *m* (the last from Cordova), are the only ones in which the upper whorls are not chalky-white, but still brownish.

9. **Pachychilus apis.**

Melania apis, Lea, P. Z. S. 1850, p. 90[1]; Ann. & Mag. Nat. Hist. ix. p. 69 (1852)[2]; Reeve, Conch. Icon. xii., *Melania*, t. 38. fig. 266[3]; Brot, in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, Melaniaceen, p. 40, t. 5. fig. 3 (copy from Reeve)[4].

Melania (*Elimia*) *apis*, H. & A. Adams, Gen. Moll. i. p. 300[5].

Pachychilus apis, Fisch. & Crosse, Miss. Scient. Mex., Moll. ii. p. 356[6].

A distinct spiral keel on the whorls preceding the last, two on the last itself, according to the figure[3]; in Lea's descriptions[1 2], however, four keels are mentioned.

Ilab. E. Mexico: Vera Cruz, in marshy places[1–4].

Brot[4] suggests that *P. apis* may be an angulated variety of *P. turatii*. I cannot understand why Lea has named this species *apis*, "bee" (or Apis, the sacred ox of the old Egyptians ?).

10. **Pachychilus indiorum.**

Melania lævissima (Sow.), Brot, Matériaux fam. Mélaniens, i. p. 42[1]; in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, Melaniaceen, p. 34 (part.), t. 4. fig. 5 *b*[2].

Pachycheilus lævissimus, H. & A. Adams, Gen. Moll. i. p. 299, t. 31. fig. 7 (1854)[3].

Pachychilus lævissimus, Fisch. & Crosse, Miss. Scient. Mex., Moll. ii. p. 328[4].

Melania indiorum, Morelet, Test. Noviss. i. p. 25 (1849)[5]; Petit Journ. de Conch. iv. p. 162, t. 5. fig. 7 (*indorum*) (1853)[6]; Hanley, Conch. Miscell., *Melania*, t. 3. fig. 24[7].

Pachycheilus indiorum, H. & A. Adams, Gen. Moll. i. p. 299[8]; Chenu, Manuel de Conch. i. p. 289, fig. 1983[9].

Melania sallei, Reeve, Conch. Icon. xii., *Melania*, t. 19. fig. 133 (1860)[10].

Melania radix, Brot, loc. cit. p. 30, t. 3. fig. 5[11].

Hab. E. Mexico: San Andres Tuxtla (*Sallé*[4]).

S.E. Mexico: Palenque, in small streams near the ruins (*Morelet*[5]); Isthmus of Tehuantepec, State of Oaxaca (*Sumichrast*[4]).

H. v. Ihering (*in litt.*) says that this species occurs also in N. and E. Guatemala,

especially in the affluents of the Rio Usumacinta; but as his specimens have not been seen by me, I can neither confirm nor refute his statement.

Var. *costato-plicatus.*

Pachychilus lævissimus (Sow.), Tristram, P. Z. S. 1863, p. 413 [12].
Melania lævissima, var. *α. costato-plicata*, Brot, loc. cit. p. 35, t. 5. fig. 5 [13].
Pachychilus lævissimus, var. *γ. costatoplicatus*, Fisch. & Crosse, loc. cit. p. 329, t. 33. fig. 5 [14].

With numerous more or less distinct vertical plaits.

Hab. S.E. Mexico: Palenque, with the type-form (*Morelet* [13 14]).
N. Guatemala: Rio de la Pasion, Alta Vera Paz (*Salvin* [12]).

Var. *varicosus.*

Melania corvina, var. *α*, Brot, loc. cit. p. 37, t. 5. figg. 1, 1 *a* [15].
Pachychilus lævissimus, var. *δ. varicosa*, Fisch. & Crosse, loc. cit. p. 329, t. 53. fig. 6 [16].

With several strong vertical plaits, transversely ridged.

Hab. S E. Mexico, Palenque (*Morelet* [15 16]).

Having examined a large number of Venezuelan specimens of *P. lævissimus*, Sow., I cannot follow Brot and Fischer and Crosse in regarding it as identical with *P. indiorum*, Morel., of E. and S.E. Mexico. The Venezuelan shell is thicker and ovoid; the upper whorls are only a little more convex, the spire in consequence not being so exactly conical in *P. lævissimus*, but rather convex-conical (very often, however, it is much eroded); the last whorl, on the contrary, is more convex in its greatest periphery in *P. indiorum*, more oblong and compressed in *P. lævissimus*; the peristome in this latter is very thick and blunt, produced below anteriorly in such a manner that the whole plane of the aperture becomes concave, protuberant beneath, and the junction of the basal with the columellar margin is rounded, not angular as in *P. indiorum.*

M. helleri (Parr.), Brot, Matériaux fam. Mélaniens, iii. p. 29, t. 4. fig. 1 (1872); and in Martini and Chemnitz, Syst. Conch.-Cab. ed. 2, Melaniaceen, p. 33, t. 4. figg. 4 *a*, *b*, appears to me to be identical with the Venezuelan form, and therefore with *P. lævissimus*, Sowerby, Hanley (Conch. Miscell. t. 3. fig. 23), and Reeve (Conch. Icon. xii. fig. 126). The localities given by Parreyss for his exotic shells are often unreliable.

M. radix, Brot, merely differs from *P. indiorum* in having a comparatively smaller aperture and a more swollen last whorl; he gives as locality "Central America."

Morelet wrote "indiorum": the classical name for the people of India is "Indi," gen. Indorum; he did not, however, mean the inhabitants of the East Indies known to the classical writers, but the American natives, called "Indios" by the Spaniards; we may therefore tolerate the form *indiorum.*

11. **Pachychilus dalli.** (Tab. XXVI. fig. 4.)

Pachycheilus dalli, Pilsbry, Science, new series, iii. p. 608 (April 1896) [1]; Proc. Acad. Phil. 1896, p. 269, with fig. [2].
Pachycheilus walli (Pilsbry), Zool. Anzeiger, xix. no. 502, p. 223 (1896) (typographical error) [3].

Near *P. indiorum*, but differing from it in having a remarkable sinus in the upper part of the external margin of the aperture and a shallower one below, the middle part in consequence projecting as in the genus *Melanatria*. This sinuosity appears only in adult shells, the striæ of growth half a whorl backward of the aperture being quite straight. As five adult specimens are known, we may presume that it is not a monstrosity.

Hab. S.W. Mexico: Tehuantepec (*Dr. Spear* [1 2]).

I give a copy of Pilsbry's figure.

12. **Pachychilus chrysalis.** (Tab. XXVII. figg. 6–9, juv.; 15–18.)

Melania chrysalis, Brot, Matériaux fam. Mélaniens, iii. p. 39, t. 2. fig. 5 (1872) [1]; in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, Melaniaceen, p. 47, t. 5. fig. 11 [2].

Pachychilus chrysalis, Fisch. & Crosse, Miss. Scient. Mex., Moll. ii. p. 342, t. 51. figg. 8, 8 *a–c* [3]; Pilsbry, Proc. Acad. Phil. 1892, p. 340 [4].

Pachychilus chrysalis, var. *β. vulnerata*, Fisch. & Crosse, loc. cit. p. 342, t. 51. figg. 9, 9 *a*, 10, 10 *a* [5].

Pachychilus larvatus, Brot, Syst. Conch.-Cab. ed. 2, Melaniaceen, p. 336, t. 34. figg. 11, 11 *a–c* [6]; Fisch. & Crosse, loc. cit. p. 344 [7].

Last whorl comparatively long and compressed, giving this species the appearance of a pupa (or chrysalis) of a large moth.

Hab. S.E. Mexico: San Pedro Gineta, on the Isthmus of Tehuantepec, State of Chiapas (*Sumichrast* [3 5 6 7]); Ixtacomitan, Chiapas (*Rovirosa* [4]); Teapa, Tabasco (*H. H. Smith*).

The habitat of the typical specimens is given as "Tehuantepec" (*Geale* [1 2]): I presume that this refers also to the shells collected there by Sumichrast.

The examination of a considerable number of specimens collected by Mr. H. H. Smith at Teapa shows that Brot's var. *larvatus* and Fischer and Crosse's var. *vulneratus* cannot be maintained as distinct varieties; they are only individual differences caused by more or less extended erosion of the upper whorls. The dimensions of a few selected specimens from Teapa are as follows:—

a.	Long.	52,	diam.	24;	apert.	long.	24,	diam.	17	millim.	Anfr. superst. $3\frac{1}{2}$.
b.	„	45,	„	24;	„		23,	„	$16\frac{1}{2}$	„	„ 3.
c.	„	50,	„	22;	„		23,	„	14	„	„ 4.
d.	„	47,	„	20;	„		20,	„	14	„	„ $4\frac{1}{2}$.
e.	„	32,	„	17;	„		15,	„	10	„	„ $5\frac{1}{2}$.
f.	„	25,	„	13;	„		$12\frac{1}{2}$,	„	$8\frac{1}{2}$	„	„ $4\frac{1}{2}$.
g.	„	18,	„	11;	„		9,	„	6	„	„ ?

The specimen *b* is nearly as old and full-grown as *a*, but it is eroded to a greater extent, and therefore distinctly shorter than *c* and *d*, which are inferior to it in the other dimensions. The specimens *e*, *f*, and *g* are evidently young, not full-grown, with thin peristome; they are a little more conical, their last whorl being comparatively broader.

Var. *nympha*, n. (Tab. XXVII. figg. 12–14.)

Of smaller size and comparatively a little narrower.

Long. 36, diam. 16; apert. long. 15, diam. 10 millim. Anfr. superst. 6.
„ 34, „ 17; „ $16\frac{1}{2}$, „ 11 „ „ $4\frac{1}{2}$.

Hab. Salvador: Rio Sucio.

Two specimens, apparently full-grown, both given me by Dr. O. Stoll; but not collected by himself.

13. **Pachychilus panucula.**

Melania panucula, Morelet, Test. Noviss. ii. p. 23 (1851) [1]; Brot, in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, Melaniaceen, p. 27, t. 3. figg. 3, 3 *a*, *b* [2].

Pachychilus panucula, Fisch. & Crosse, Miss. Scient. Mex., Moll. ii. p. 341, t. 53. figg. 8, 8 *a* [3].

Intermediate in form between *P. corvinus* and *P. chrysalis*; base of the aperture somewhat produced.

Hab. S.E. Mexico: State of Chiapas (*Parreyss* [3]).

N. Guatemala: Rivers of the Department of Peten (*Morelet* [1 2]), especially the R. Mopan (*Morelet* [3]).

The specific name is derived from the Latin words *panus*, *panucellium*, "a heap of wool at the spindle"; different from *pannus*, *panniculus*, "a scrap of cloth."

Var. *mexicanus.*

Melania mexicana, Reeve, Conch. Icon. xii., *Melania,* t. 18. fig. 129 [4]; Brot, in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, Melaniaceen, p. 45, t. 5. fig. 9 (copy from Reeve) [5].

Pachychilus mexicanus, Fisch. & Crosse, Miss. Scient. Mex., Moll. ii. p. 340 [6].

Last whorl more swollen in its basal part, resembling a bag, the columellar margin therefore very oblique.

Hab. Mexico, without nearer indication of locality [4 5 6], probably S.E. Mexico.

Brot's figure 9 *a* has not the characteristic form of this variety, and may belong to the typical *P. panucula.*

Var. *tumidus.* (Tab. XXV. fig. 5.)

Melanoides tumidus, Tristram, P. Z. S. 1863, p. 413 [7].

Melania tumida, Brot, loc. cit. p. 23 [8].

Pachychilus tumidus, Fisch. & Crosse, loc. cit. p. 357 [9].

Very large; upper whorls nearly even, but very convex at the periphery, rapidly narrowed below; base of the aperture distinctly produced into an angular lobe.

a. Long. 65, diam. 32; apert. long. 23, lat. — millim.

b. „ 64, „ 28; „ $25\frac{1}{2}$, „ 17 „ Anfr. superst. 7.

a. Tristram's statement; *b*. Measurements of the specimen sent to me for examination.

Hab. N. Guatemala: Lake of Peten (*Salvin* [7–9]).

14. **Pachychilus örstedi.** (Tab. XXVII. figg. 3–5.)

Pachychilus örstedii, Mörch, in Malak. Blätt. vii. p. 79 (1860) [1].

Melania örstedtii, Brot, Matériaux fam. Mélaniens, iii. p. 29, t. 3. fig. 10 [2]; in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, Melaniaceen, p. 46, t. 5. fig. 10 [3].

Melania gassiesi (Reeve), Tate, Amer. Journ. Conch. v. p. 152 (1876) [4].

Pachychilus jansoni, H. Adams, P. Z. S. 1870, p. 795 [5]; Brot, loc. cit. p. 40 [6].

Near *P. chrysalis* and *P. panucula*, but with the penultimate whorl not so large as in the former and the last whorl somewhat more convex than in the latter; columellar margin strongly arched.

Hab. E. NICARAGUA: Segovia (*Œrsted* [1–3]); Matagalpa, in the Arroyo Alasan (*Rothschuh, in Mus. Berol.*); Chontales (*Janson* [5 6]); on stones in the rocky beds of the clear, rapid-flowing streams taking their rise in the Chontales Mountains (*Tate* [4]).

The editors of this work have sent me some specimens of the same species labelled as having been probably collected in Costa Rica by Mr. Rogers.

These shells, like others from Matagalpa, are generally a little more ventricose than the figures given by Brot [2 3], and they also differ in this respect from the measurements given by H. Adams [5]. I have not seen any of Tate's examples, and he gives no description; but as Reeve's figure of *M. gassiesi* (not that of Brot and Fischer and Crosse) is rather near *P. örstedi*, and the locality coincides so well, I think it is quite probable that they belong to this species.

Var. *planensis*.

Melania planensis, Lea, Proc. Acad. Phil. x. p. 118 (1858) [7]; Obs. Unionidæ, xi. p. 83, t. 22. fig. 26 (1864) [8]; Brot, loc. cit. p. 33, t. 4. fig. 3 [9].

Very large and somewhat more cylindrical. Long. 56, diam. 23; apert. long. 23 millim.

Hab. HONDURAS: Plan and Omoa, valley of the Ulua River, Atlantic slope (*Le Conte* [7–9]).

A shell found by Dr. O. Stoll in the Sierra del Mico, near Yzabal, Eastern Guatemala, long. 43, diam. 19½, apert. 19½ millim., remaining whorls 5, probably belongs to this variety.

15. Pachychilus cinereus.

Melania cinerea, Morelet, Test. Noviss. i. p. 26 (1849) [1]; Reeve, Conch. Icon. xii., *Melania*, t. 35. fig. 235 [2]; Brot, in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, Melaniaceen, p. 38, t. 4. fig. 6 [3].

Pachychilus cinereus, Fisch. & Crosse, Miss. Scient. Mex., Moll. ii. p. 334, t. 52. figg. 8, 8 *a–c* [4].

Hab. N. GUATEMALA: in the river of Coban, Alta Vera Paz (*Morelet* [1–3], *Bocourt* [4]).

H. v. Ihering (*in litt.*) states that *P. cinereus* is a local variety of *P. indiorum*; I have not seen a specimen of it.

16. Pachychilus explicatus.

Pachychilus indifferens, var. *explicata*, Fisch. & Crosse, Miss. Scient. Mex., Moll. ii. p. 337, t. 53. figg. 9, 9 *a* (10, 10 *a*) [1].

Hab. N. GUATEMALA: Rio Machaquila, Department of Peten (*Morelet* [1]).

The two examples figured by Fischer and Crosse seem to differ greatly *inter se*. Fig. 9 has a strongly arcuated columellar margin, without basal projection; it may represent

another species, intermediate between *P. indiorum* and *P. graphium*. Fig. 10, on the contrary, has quite the appearance of a young shell, with the base of the last whorl more fully rounded and the base of the aperture apparently (?) projecting. I have not seen either of the specimens.

17. **Pachychilus corvinus.**

Melania corvina, Morelet, Test. Noviss. i. p. 26 (1849) [1]; Hanley, Conch. Miscell., *Melania*, t. 2. fig. 16, and var. t. 3. fig. 25 [2]; Reeve, Conch. Icon. xii., *Melania*, t. 19. fig. 135 *b* [3]; Brot, in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, Melaniaceen, p. 36, t. 5. fig. 1 [4].

Pachycheilus corvinus, H. & A. Adams, Gen. Moll. i. p. 298, t. 31. figg. 7 *a*, *b* (operculum) [5]; Tristram, P. Z. S. 1861, p. 233 [6]; Fisch. & Crosse, Miss. Scient. Mex., Moll. ii. p. 336, t. 52. figg. 7, 7 *a–c* [7]; Pilsbry, Proc. Acad. Phil. 1892, p. 340 [8] (nec Chenu, Manuel Conch. i. p. 289, fig. 1960).

Stoutly conical; last whorl rather convex, unicolorous, chestnut-brown; plane of the aperture concave; peristome thick, the interior with a dark brown marginal zone, the base rounded. Salvin's specimen measures:—Long. 35, diam. 18; apert. long. 16 millim.

Hab. S.E. Mexico: Montañas de Poana [1], Tabasco (*Rovirosa* [8]).

N. Guatemala: smaller streams of the Department of Vera Paz (*Morelet* [1 4]); Coban (*Morelet*, *Bocourt* [7]); Tactic (*Bocourt* [7]).

W. Guatemala: Lake of Dueñas (from O. Salvin's first collection); in the stream of Santa Rosa, a tributary of the Rio Negro (*Stoll*).

Var. *lutescens*.

Melania corvina, Reeve, loc. cit. fig. 135 *a* [9].

Pachychilus corvinus, var. *lutescens*, Fisch. & Crosse, loc. cit. p. 336, t. 53. figg. 7, 7 *a* [10].

Shell pale yellowish-grey.

Hab. N. Guatemala: Coban (*Morelet* [10]).

Var. *indifferens*. (Tab. XXVII. figg. 10; 11, 11 *a*, juv.)

Pachychilus indifferens, Crosse & Fisch. Journ. de Conch. xxxix. p. 25 (1891) [11]; Miss. Scient. Mex., Moll. ii. p. 337, t. 50. figg. 8, 8 *a–c* [12].

Of smaller size; spire more conical and acuminated.

Hab. N. Guatemala: Chiacam, near Lanquin, on the Cahabon River, an affluent of the Polochic (*Champion*).

E. Guatemala: Rio Motagua (*Bocourt* [12]).

Among the specimens collected by Mr. Champion there are several very minute ones (figg. 11, 11 *a*), measuring 4–5 millim. only in length, with acute, not eroded, black-coloured apex and five to six whorls; they are without doubt very young, perhaps just hatched.

C. Subgen. Oxymelania.

Oxymelania, Fischer & Crosse, Miss. Scient. Mex., Moll. ii. pp. 328, 366 (1892).

More or less slenderly elongate; upper whorls not eroded; peristome very thick, swollen, somewhat expanded.

18. Pachychilus graphium.

Melania graphium, Morelet, Test. Noviss. i. p. 26 (1849) [1]; Hanley, Conch. Miscell. *Melania,* t. 4. fig. 35 [2].

Pachycheilus graphium, H. & A. Adams, Gen. Moll. i. p. 298 (1854) [3].

Pachychilus graphium, Fisch. & Crosse, Miss. Scient. Mex., Moll. ii. p. 332, t. 51. figg. 2, 2 *a* [4].

Pachychilus cumingii, Lea, P. Z. S. 1850, p. 179 [5]; Ann. & Mag. Nat. Hist. (2) ix. p. 58 (1852) [6] (repetition).

Melania renovata, Brot, Matériaux fam. Mélaniens, i. p. 43 (1862) [7]; in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, Melaniaceen, p. 41, t. 5. fig. 5 [8].

Pachychilus gracilis, Tristram, P. Z. S. 1863, p. 413 [9].

Melania gracilis (Tristram), Brot, loc. cit. p. 42 [10].

Pachychilus tristrami, Fisch. & Crosse, loc. cit. p. 369 [11].

Hab. N. Guatemala: Lake of Peten (*Salvin* [9 10 11]); streams of Vera Paz (*Morelet* [1]); Rio de Tactic (*Morelet* [4]); Sabo, Alta Vera Paz (*Champion*); Chiacam, near Lanquin, on the Cahabon River, an affluent of the Polochic (*Champion*); Coban *, in large rivers (*Lea* [5 6]).

Central Guatemala: Huehuetenango (*v. Ihering, in litt.*); Salina La Magdalena, at Sacapulas, Department of Quiché, 7000 feet above the sea (*Stoll*).

The specific name *graphium* is Latin, from the Greek γραφεῖον, a "style" or "pencil."

Var. *reductus.*

Melanium graphium (Morelet), Reeve, Conch. Icon. xii., *Melania,* t. 21. fig. 150 [12]; Brot, in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, p. 41, t. 5. fig. 4 [13].

Pachychilus graphium, var. *reducta,* Fisch. & Crosse, loc. cit. p. 333 [14].

Somewhat broader.

Hab. N. Guatemala: Vera Paz (*Morelet* [12 13]).

Var. *transcendens.*

Melania cumingi, Reeve, loc. cit. fig. 149 (1860) [15] (nec *M. cumingi,* Lea, 1850, from the Philippines).

Pachychilus graphium, var. *transcendens,* Fisch. & Crosse, loc. cit. p. 333, t. 50. figg. 7, 7 *a* [16].

Of larger size.

Hab. Central Guatemala: San Miguel Uspantan, Dept. Quiché, in affluents of the Rio Usumacinta (*Stoll* [16]).

I have specimens of this variety from Dr. O. Stoll himself, and it is mentioned in his work on Guatemala (p. 382). Schneider, who is referred to by Fischer and Crosse [16]

* Lea gives "Copan," probably a mistake for Coban, see *anteà*, p. 444.

for the locality quoted, is without doubt the dealer Gustav Schneider, of Basle, who had Dr. Stoll's shells for sale.

19. **Pachychilus schiedeanus.**

Melania schiedeana, Philippi, Abbild. neuer Conch. i. p. 62, t. 2. fig. 11 (1843) [1]; Reeve, Conch. Icon. xii., *Melania*, t. 15. fig. 101 [2]; v. Mart. in Malak. Blätt. xii. p. 51 (1865) [3]; Strebel, Beitr. Mex. Land- und Süssw.-Conch. i. p. 35, t. 4. figg. 37, 37 *a* [4]; Brot, in Martini & Chemnitz, Syst. Conch.-Cab. ed. 3, Melaniaceen, p. 42, t. 5. figg. 6, 6 *a* [5].

Vibex (*Juga*) *schiedeana*, H. & A. Adams, Gen. Moll. i. p. 305 [6].

Pachychilus schiedeanus, Troschel, Gebiss d. Schnecken, i. p. 116, t. 9. fig. 3 (radula) [7]; Fisch. & Crosse, Miss. Scient. Mex., Moll. ii. p. 366, t. 50. figg. 10, 10 *a*, *b* [8].

Melania variegata, Wiegmann, in Mus. Berol. [9]; Menke, Synops. Moll. p. 43 (1830) (sine descr.) [10].

The most slender and acute of all the Central-American species, but varying somewhat in this respect. The peristome is distinctly thick and obtuse, somewhat expanded below; colour usually pale brown, with more or less distinct reddish-brown stripes.

Hab. E. Mexico: Rio de Misantla, in the hot region, on stones (*Deppe & Schiede* [3]); Arroyo Viejo, three miles from Misantla (*Strebel* [4]); Misantla and Cordova (*Höge*); Coatepec (*Strebel, in Mus. Berol.*).

?? Central Mexico: in small brooks and ditches around the city of Mexico (*Schiede* [1]).

Although the last-named locality seems very precise, yet I have some misgiving about it, for the following reasons: (1) on the labels of the Berlin Museum, from the time of Wiegmann (+1841), Misantla is named as the habitat in which this species was found by Schiede, and it is also noted as from the "heisse Region" (tierra caliente); (2) no subsequent collector has found it there, not even Prof. A. Heilprin, who collected in the environs of the city of Mexico in 1890 (*cf.* Proc. Acad. Phil. 1892, pp. 325–331). The occurrence at Misantla, on the contrary, is corroborated by both Strebel and Höge.

Troschel has examined the radula and found it to be like that of *P. lævissimus*, the type of the genus.

Var. *strebelianus*.

Melania saussurei (Brot ?), Strebel, loc. cit. p. 36, t. 4. figg. 43, 43 *a* [11].

Pachychilus schiedeanus, var. *strebeliana*, Fisch. & Crosse, loc. cit. p. 369 [12].

Whorls more rounded. A somewhat doubtful form, apparently very different from the preceding.

Hab. E. Mexico: stream of Palpoala, close to Misantla (*Strebel* [11]).

20. **Pachychilus saussurei.**

Melania saussurei, Brot, in Rev. Zool. 1860, p. 264, t. 17. fig. 11 [1]; in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, Melaniaceen, p. 43, t. 5. fig. 7 [2].

Pachychilus saussurei, Fisch. & Crosse, Miss. Scient. Mex., Moll. ii. p. 368 [3].

Shell with three rows of granular elevations beneath the suture; otherwise near *P. schiedeanus*.

Hab. Central Mexico: in swamps in the woods bordering the Rio Grande, between "Tampico and Mexico" (*Saussure* [1–3]).

This river, which must not be confused with the well-known Rio Grande del Norte, runs into the Lagoon of Meztitlan, the road from Tampico to Mexico city crossing it between Zacualtipan and Atotonilco, in the State of Hidalgo. The Lagoon of Meztitlan lies west of the Sierra Madre and does not drain into either the Atlantic or the Pacific *.

D. Subgen. Potamanax.

Potamanax, Pilsbry, Proc. Acad. Phil. 1892, p. 341.

Shell short, ventricose, approaching to the ovate form; aperture simply rounded beneath, with thickened, callous, columellar margin.

21. **Pachychilus sargi.**

Melania sargi, Crosse & Fisch. Journ. de Conch. xxiii. p. 226 (1875) [1]; xxiv. t. 11. fig. 4 [2]; Brot, in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, Melaniaceen, p. 335, t. 34. figg. 12, 12 *a* [3].
Pachychilus sargi, Fisch. & Crosse, Miss. Scient. Mex., Moll. ii. p. 338, t. 51. figg. 6, 6 *a*, 7 [4].

The shortest and most *Littorina*-like of all the Central-American species. Last whorl subangulated.

Hab. N. Guatemala: Coban (*Schneider* [4]); Cahabon (*Champion*).

The typical specimens were found by Mr. Sarg, probably in the vicinity of Coban, where he resided for a long time. Crosse and Fischer merely give "Guatemala (*Sarg*)" as the locality [1 2].

22. **Pachychilus pilsbryi,** n. n.

Potamanax rovirosai, Pilsbry, Proc. Acad. Phil. 1892, p. 341, t. 14. figg. 8, 9 [1].

Very near the preceding, but with the last whorl simply convex, not subangulated, and with more distinct spiral lines.

Hab. S.E. Mexico: mountains of Poana, State of Tabasco (*Rovirosa* [1]).

As there is a *Pachychilus glaphyrus*, var. *rovirosai*, mentioned on a preceding page in Pilsbry's paper (*loc. cit.* p. 339), the name of the present species must be changed.

Pilsbry says that the operculum of his genus *Potamanax* is very different from that of *Pachychilus*, it having but few whorls, with a basal nucleus; but as the operculum of the two Central-American species of this section is not yet known, Pilsbry's description of it having been taken from the Cuban *P. brevis*, d'Orb., which he treats as congeneric, I prefer to keep the two Central-American forms in the genus *Pachychilus* until further information is obtained.

* I am indebted to Dr. Seler, of Berlin, for information as to the position of this river, which is not marked on most maps.

SEMISINUS.

Hemisinus, Swainson, Treatise on Malacology, 1840, pp. 200, 341; H. & A. Adams, Gen. Moll. i. p. 302; Brot, in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, Melaniaceen, p. 368.

Semisinus, P. Fischer, Manuel de Conch. p. 701 (1885); Fischer & Crosse, Miss. Scient. Mex., Moll. ii. p. 313.

General shape of *Melania* and *Pachychilus*, but with the base of the columellar margin notched obliquely and therefore separated distinctly from the basal margin. The Central-American species exhibit a strong spiral sculpture.

Operculum paucispiral, horny, the nucleus near its lower end.

Edges of the mantle fringed, as in the Old-World *Melaniæ*.

Radula comparatively shorter than in *Pachychilus*; central tooth subquadrangular, multicuspidate, with a slight elevation in the middle of its plane; lateral tooth multicuspidate; marginal teeth very long, quadri- or quinque-cuspidate.

Viviparous.

The anatomy of the Central-American species is given by Fischer and Crosse, *loc. cit.*

Semisinus is a philological correction of the hybrid word *Hemisinus*.

1. **Semisinus ruginosus.**

Melania ruginosa, Morelet, Test. Noviss. i. p. 25 (1849) [1].

Hemisinus ruginosus, H. & A. Adams, Gen. Moll. i. p. 303 [2]; Reeve, Conch. Icon. xii., *Melania*, t. 3. figg. 13, 13 *b* [3]; Brot, in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, Melaniaceen, p. 394, t. 41. fig. 1 [4], and var. *β*, p. 395, t. 41. figg. 2, 2 *a* [5]; Stoll, Guatemala, Reisen u. Schilderungen, 1886, p. 461 [6].

Semisinus ruginosus, Fisch. & Crosse, Miss. Scient. Mex., Moll. ii. p. 318, t. 50. figg. 11, 11 *a–d* [7].

Melania petenensis, Tristram, P. Z. S. 1862, p. 414 [8].

Hemisinus petenensis (Tristram), Brot, Matériaux fam. Mélaniens, ii. p. 51 [9].

Hemisinus zoster, Brot, op. cit. i. p. 62 (1862) [10].

Shell oblong, with 6–7 flat remaining whorls, encircled by strong spiral ridges, 4–7 on the whorl before the last; last whorl rather slender, its diameter not equalling the length of the aperture. Long. 23–27, diam. 8–10½; apert. long. 8½–11 millim.

Hab. N. Guatemala: Lake of Peten (*Salvin* [8]).

E. Guatemala: Lake of Yzabal (*Morelet* [1]; *Bocourt* [7]; *Stoll* [6]; *Sopper, teste v. Ihering*).

Varies considerably in the diameter of the last whorl, which is in some examples equal to the length of the aperture (*petenensis*, Tristr., type spec.; Reeve, fig. 13 *b*; Brot, figg. 2, 2 *a*; Fischer & Crosse, figg. 11, 11 *a*), in others considerably less (Reeve, fig. 13; Brot, fig. 1; Fischer & Crosse, t. 50. fig. 11 *b*): Fischer suggests that this may be a sexual difference. The specimens sent me by Canon Tristram from the Lake of Peten, and those figured by Fischer and Crosse from the Lake of Yzabal, show that the two forms occur in both lakes.

S. kochi, Bernardi, Journ. de Conch. v. t. 3. fig. 6 (1856); Reeve, loc. cit. fig. 21; and Brot, loc. cit. p. 385, t. 40. fig. 4, from Brazil (and, according to H. v. Ihering, also from Eastern Peru), is allied to this species, but it has the last whorl more ventricose and longer in regard to the whole length of the shell.

NERITINA.

Neritina, Lamarck, Philosophie Zool. i. p. 321 (1809); Hist. Nat. Anim. sans Vert. éd. 1, vi. 2, p. 183, éd. 2, viii. p. 564; Sowerby, Conch. Illustr. parts 86 &c. (circa 1838); Thes. Conch. ii. p. 507 (1849); Récluz, in Journ. de Conch. i. pp. 143–154 (1850); v. Martens, in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, ii. part 10 (1875–79); Fischer & Crosse, Miss. Scient. Mex., Moll. ii. p. 456.

Shell semiglobose or globose, with few whorls; aperture large, semicircular; columellar margin straight, cutting, continued outside in a distinct plane (area), formed by a glossy peculiarly coloured shelly deposit, the margin itself usually finely toothed, seldom smooth, the outer margin of the aperture not toothed within. The exterior of the shell usually covered with a dark greenish or blackish periostracum, generally smooth.

Operculum oblong-semicircular, calcareous, with a membranaceous edge at the external convex border; two projecting processes (apophyses) within, one at the lower end of the operculum, straight, somewhat oblique, usually stout, but in some of the subdivisions of the genus scarcely or not at all developed, the other arcuated, compressed, encircling the former.

Two long filiform feelers, the eyes on tubercles at their outer base.

Radula rhipidoglossate.

Most of the species living in fresh water, running or stagnant, some also in brackish or salt water, crawling on stones or other solid objects. Oviparous; several eggs in a convex, membranaceous, pale yellow, pouch-shaped egg-capsule (ovicapsula), which is attached to the outside of other shells of the same species or to those of other genera, e. g. to *Pachychilus*, which live in the same water.

The genus *Neritina* may be subdivided as follows:—

A. Neritæa, Roth.

Both apophyses of the operculum well developed and separated from one another.
Columellar margin denticulated, not peculiarly sinuated.

To this subgenus belong the majority of the Mexican and Central-American species, especially all true freshwater forms. They can be separated into three groups, according to the general form of the shell:—

Comparative Table of the Species of *Neritina*.

Nomen.	Figura.	Coloratio.	Spira.	Area columellaris.	Margo columellaris.	Diam. maj.	Alt.	Marg. col.	Patria.
latissima, *Brod.*	depresse convexa, utrinque alata.	olivacea, maculis parvis, nigro-marginatis.	vix prominula, obtusa.	subplana, alba, superne callosa.	paulum sinuatus, dent. c. 10, parvis, obtusis.	mm. 23–31	mm. 30–48	mm. 15–16	S.W. Nicaragua, S.W. Costa Rica.
——, var. globosa, *Brod.*	oblique convexa, supra breviter alata.	,,	,,	,,	,,	19	19	12	S.W. Costa Rica, S. Panama.
——, var. intermedia, *Sow.*	oblique convexa, non alata.	,,	,,	,,	,,	22	18	11	S.W. Nicaragua, S.W. Costa Rica, S. Panama.
punctulata, *Lam.*	oblique convexa.	fusca, maculis minimis plurimis pallide flavis.	vix prominula, involuta, sutura lacera.	subplana, flavescens, extrorsum sursum ascendens.	vix sinuatus, denticulis obsoletis.	29	20	16	E. Mexico, Antilles.
turbida, *Morel.*	semiglobose convexa.	olivaceo-fusca, maculis majoribus triseriatis nigro-marginatis.	vix prominula, obtusa.	subplana, fulvescens, subangusta, superne callosa.	subrectus, denticulis obsoletis.	9–15	8–15	5½–9	W. Guatemala, S.W. Costa Rica.
lineolata, *Lam.*	globosa.	olivaceo-viridis, lineolis nigris confertis, sutura nigra.	prominula, conica.	convexa, alba vel flavescens.	subrectus, dent. 10–12, parvis, distinctis, uno majore.	15–23	14½–22	9–12½	Centr., E., & S.E. Mexico, Yucatan, Brit. Honduras, E. Guatemala.
——, var. reclivata, *Say*	conoideo-globosa.	,,	prominens, conica.	,,	,,	10–18	15–23	6½–10	S.E. United States, E. Mexico, E. Guatemala, Cuba.
——, var. reticulata, *Cr. & Jan.*	globosa.	nigro-reticulata, sutura nigra.	,,	,,	,,	18–21	18–20	11	E. Mexico, Brit. Honduras, E. Guatemala, Antilles.
——, var. parcepicta, *v. Mart.*	,,	lineolis nigris, rarioribus abbreviatis.	,,	,,	,,	8–15	9–17	6	E. Guatemala.
cassiculum, *Sow.*	gibboso-globosa.	olivacea, maculis albidis nigro-marginatis numerosis.	prominula, obtusa.	subconvexa, alba, extrorsum aurantia.	subrectus, dent. parvis, c. 11.	17	17	10½	N.W. Mexico.

[pulchra, *Sow.*]	subconoideo-globosa.	olivacea, nigro-marmorata, interdum rufo-variegata.	prominens, conica.	planiuscula, flavescens.	dent. obsoletis.	16–18	16–18	8–9	? Panama.
virginea, *L.*, var. listeri †, *Pfr.*	globosa vel subconoidea.	pallida, nitida, lineolis nigris et maculis nigro-marginatis variepicta.	prominens, obtuse conica.	convexa, subangusta, subtus dilatata (extrorsum flavescens).	subrectus, dent. 4–6, parvis.	10–13	9–15	5½–7	E. Mexico, Yucatan, Brit. Honduras, S.E. Nicaragua, E. Costa Rica, &c.
*pupa, *L.*	subglobosa.	alba, strigis nigris, latis, apert. flava.	prominula, obtusa, subangulata.	plana, parva, alba.	subsinuatus, dent. 5, parvis.	8–13½	7½–13	4⅓–7⅓	? E. Mexico.
*picta, *Sow.*	globosa.	pallide flava, strigis obliquis cæruleo-albis nigro-limbatis.	prominula, obtusa.	subconvexa, rufo-castanea.	leviter sinuatus, dent. 5–8, distinctis.	11–13	14–10	6–8	N.W. Mexico, Salvador, S.W. Costa Rica, S. Panama.
——, var. luteofasciata, *Mill.*	,,	zonis latis griseis et flavis, utrisque albo-strigatis.	,,	,,	,,	,,	,,	,,	N.W. Mexico, S. Panama.
——, var. nigrofasciata, *Mill.*	,,	zonis nigris, interstitiis strigatis.	,,	,,	,,	,,	,,	,,	N.W. Mexico, Panama.
——, var. guttata, *Mill.* ...	,,	strigis abbreviatis, maculæformibus.	,,	,,	,,	,,	,,	,,	?
——, var. serta, *v. Mart.*...	,,	flavida, maculis albis triseriatis.	,,	,,	,,	,,	,,	,,	N.W. Mexico, W. Costa Rica, S. Panama.
——, var. subnigra, *v. Mart.*	,,	tota fere nigricans.	,,	,,	,,	,,	,,	,,	W. Costa Rica.
[michaudi, *Récl.*]	subglobosa.	olivacea, lineis perobliquis fulminatis nigris.	prominula, plerumque erosa.	subconvexa, infra dilatata, albida.	leviter sinuatus, dent. obtusis, primo maximo.	11	10	6	? Panama.
[sargi, *Staud.*]	semiglobosa.	nigro-violacea.	obtusa, erosa.	plana, lata, albida.	rectus, dent. 0.	7–8	6	4	? Guatemala.
*viridis, *L.*.....	depressa, oblique ovata.	læte viridis, albo-maculata.	prominula, parva.	convexa, lata virescenti-alba.	sinuatus, dent. parvis.	7½	6	4	E. Mexico, Yucatan, E. Costa Rica.

* The species marked with an asterisk are brackish- or salt-water forms.

† The typical form is found in brackish water.

a. Alina, Récluz (1842) (part.) [Semicirculatæ, v. Martens].
Shell somewhat depressed, with short spire and very large columellar plane.
Peculiar to America and Western Africa. *N. latissima* and *N. punctulata*; *N. turbida* forms a connecting-link with the following.

b. Neritæa, Roth, s. str. [Serratæ, Recluz (1841); Pictæ, Menke (1830)].
Shell globose or conoidal-globose, handsomely marked; columellar plane not so large, often convex; toothlets of the columellar margin well developed, nearly equal.
Circumtropical. *N. lineolata, N. virginea,* and *N. pulchra.*

c. Puperita, Gray (1857) [Venosæ, v. Martens].
Shell transversely elliptic, with nearly flat spire; not shining. Mostly marine.
Circumtropical. *N. pupa.*

B. Clithon, Montf.

Both apophyses of the operculum well developed and connected by an intermediate wall.
Columellar margin sinuate at its middle, distinctly denticulated, the toothlet at the upper end of the sinus the largest.

Circumtropical. *N. picta* (and *N. michaudi*).

C. Theodoxus, Montf.

The lower apophysis (peg) obsolete or absent, the other (rib) well developed.
Columellar margin not denticulated.

Chiefly European, and in the adjacent parts of Asia and Africa. (*N. sargi* and *N. mexicana*, both very doubtful as regards their habitat.)

D. Smaragdia, Issel.

Apophyses as in A. *Neritæa.*
Shell transversely oval, depressed, glossy, clear coloured.
For the differences in the radula see Troschel.

Truly marine, in the subtropical and tropical seas of both hemispheres. *N. viridis.*

In these subdivisions and in the preceding table all the species are included, whether they live in fresh or salt water. But in the following pages only those species are enumerated which are actually found in fresh water; the others will be placed at the end of the volume with the brackish-water Mollusca.

In the comparative table the height of the aperture is purposely omitted, because this can be measured in various ways, as the shell is held more or less obliquely, and it is in this genus often rather difficult to say which is the true vertical position of the shell; therefore the length of the columellar margin within the aperture is given instead, this being always considerably less than the height of the aperture itself, but affords at all events a certain measurement. The diameter major gives the breadth of the shell, and the diameter minor the amount of convexity.

1. Neritina latissima.

Neritina latissima, Broderip, P. Z. S. 1832, p. 200 [1]; Sowerby, Conch. Illustr., *Neritina*, sp. no. 29, figg. 3, 16 (before 1838) [2]; Thes. Conch. ii. p. 519, t. 104. fig. 172 [3]; Deshayes, in Lamarck's Hist. Nat. Anim. sans Vert. viii. p. 581 [4]; Récluz, Journ. de Conch. i. p. 146 (1850) [5]; Reeve, Conch. Icon. ix., *Neritina*, t. 3. fig. 13 [6]; v. Mart. in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, *Neritina*, p. 72, t. 1. figg. 6, 7 [7].

Very conspicuous from the wing-like production of both sides of the shell, above and below, by which the height of the shell, taken from the axis of the whorls, is rendered greater than the diameter across it.

Hab. S.W. Nicaragua: Realejo, in a river, adhering to rocks (*Cuming* [1–7]).

S.W. Costa Rica: Rio Grande de Pirrés (*Pittier*, Febr. 1892); Rio Punta Mala, in fresh water, 20 metres above the sea (*Pittier*, April 1892).

Var. *globosa*.

Neritina globosa, Broderip, P. Z. S. 1832, p. 201 [8]; Sowerby, Conch. Illustr. sp. no. 31, fig. 12 [9]; Deshayes, in Lamarck's Hist. Nat. Anim. sans Vert. viii. p. 582 [10].

Neritina intermedia, var., Sowerby, Thes. Conch. ii. p. 519, t. 104. figg. 174, 175 [11]; Reeve, loc. cit. t. 3. fig. 14 [12].

Neritina intermedia, var. *dilatata*, Récluz, Journ. de Conch. i. p. 146 [13].

Neritina latissima, var. *b. globosa*, v. Mart. loc. cit. p. 72, t. 7. figg. 15, 16 [14].

Upper wing less developed, lower wanting. Height and transverse diameter about equal.

Hab. S.W. Costa Rica: Gulf of Nicoya (*Cuming* [13]); Rio Grande de Terraba and Rio Punta Mala, in fresh water, 50 and 20 metres above the sea (*Pittier*).

S. Panama: Rio Chiriqui, in a river (*Cuming* [8 10]); on an island in the Bay of Montijo, in a stream * (*Cuming* [12]).

Var. *intermedia*.

Neritina intermedia, Sowerby, P. Z. S. 1832, p. 201 [15]; Conch. Illustr. sp. no. 33, fig. 7 [16] Deshayes, loc. cit. p. 583 [17]; Récluz, Journ. de Conch. i. p. 146 [18]; Tate, Amer. Journ. of Conch. v. p. 153 [19].

No wing-like projection, neither above nor below.

Hab. S.W. Nicaragua: Realejo (*Cuming* [18]).

S.W. Costa Rica: San Lucas, in the Gulf of Nicoya, a variety (*Cuming* [15 17]).

S. Panama: on an island in the Bay of Montijo, in a stream, abundantly on stones (*Cuming* [15 17]); Panama city, on the bottom of a freshwater stream, by the railway-terminus (*Tate* [19]).

Ecuador: Guayaquil (*Wolf & Boetzes*).

Peru (*Tschudi*).

Various localities upon the Pacific slope or coast are cited for this variety of

* Reeve [12] gives the locality &c. as "Island of Lions, Bay of Montijo, in a mountain-stream." I am unable to find such a place on the maps, and there cannot be mountains on any of the small islands in the Bay of that name.

N. latissima, but all are attributed to H. Cuming. In my monograph of *Neritina*[7] (pp. 74, 290) this species is stated to occur on both the Pacific and Atlantic slopes of Central America; but this was probably a mistake, owing to my being unaware at the time of the true position of the Rio Chiriqui. This river, I now find, runs into the Pacific, near Cape Burica, on the borders of Costa Rica and the State of Panama. Nevertheless, there is a specimen of *N. intermedia* in the Dunker collection labelled "Chiriqui, N. Panama," on the authority of Möschler, a dealer who received many shells from missionaries.

The shell of this species, like that of many others, is usually marked with small pale spots, which are bordered at the side towards the aperture by somewhat broad black lines; when the spots are very numerous and crowded, they give it a reticulated appearance. In some specimens the spots are nearly or quite absent. In others there are two black spiral bands, which look as if they were produced by an enlargement of the black borders into two spiral zones. Varieties of this kind are mentioned by Broderip himself[1] in *N. latissima*, and I have seen also banded forms of the var. *intermedia* from Chiriqui.

H. Pittier mentions that this species is called by the natives "sit cuah," *i. e.* small "sit."

2. Neritina punctulata.

Nerite, Argenville, Hist. Nat. Conchyliologie, éd. 1, p. 259, t. 10. fig. 3 (1742)[1]; éd. 2, t. 7. fig. 3[2]; éd. 3, par Favanne, t. 61. fig. D 1[3].

Neritina punctulata, Lamarck, in Encycl. Méth. Vers, ii. t. 455. fig. 2[4]; Sowerby, Conch. Illustr., *Neritina*, sp. no. 6, fig. 29[5]; Thes. Conch. ii. p. 520, t. 105. fig. 194[6]; Deshayes, in Lamarck's Hist. Nat. Anim. sans Vert. éd. 2, viii. p. 584[7]; Menke, in Zeitschr. f. Malak. 1850, pp. 166, 167[8]; Shuttleworth, in Bern. Mittheil. 1854 (Diagn. neuer Moll. vii.) p. 161[9]; Reeve, Conch. Icon. ix., *Neritina*, t. 10. fig. 48[10]; v. Mart. in Malak. Blätt. xii. p. 54 (1865)[11]; in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, *Neritina*, p. 76, t. 5. figg. 13–15[12]; Strebel, Beitr. Mex. Land- und Süssw.-Conch. i. p. 59, t. 1. fig. 38[13]; Fisch. & Crosse, Miss. Scient. Mex., Moll. ii. p. 472, t. 58. fig. 5 (operculum)[14].

Neritina fuscilabris, Wiegmann, MSS. in Mus. Berol.[15].

Neritina aperta, Budgin, Sowerby's Catalogue coll. Earl of Tankerville, p. 45 (1825)[16].

Neritina pulligera (Lam.), Deshayes, in Cuvier's Règne Anim. éd. 3, Illustrée, Moll. t. 47. fig. 1[17].

Shell rather flat, with very wide aperture; last whorl covering nearly all those preceding, and usually leaving an eroded spot only, instead of the spire; suture very irregular towards the aperture. Outside olivaceous-brown, with very numerous pale spots; in some specimens with one or two broad pale spiral zones. The callous deposit on the columellar area more or less distinctly extended upwards at the outer extremity.

Hab. E. Mexico: Rio de Misantla, near Misantla (*Deppe & Schiede*[11]; *Strebel*[13]); Rio de Colipa, in the district of Misantla (*Liebmann*[8]).

Antilles: Cuba (*d'Orbigny*, *Gundlach*); Jamaica (*C. B. Adams*, *Reeve*[10]); Puerto

Rico (*Blauner* [9]); Guadeloupe (*Lamarck* [7], *Bean*, &c.); Martinique (*Mörch*, *Eyries*); St. Vincent [5].

3. **Neritina turbida.**

Neritina turbida, Morelet, Test. Noviss. i. p. 27 (1849) [1]; Reeve, Conch. Icon. ix., *Neritina*, t. 29. fig. 133 [2]; v. Mart. in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, *Neritina*, pp. 80, 279 [3]; Fisch. & Crosse, Miss. Scient. Mex., Moll. ii. p. 474, t. 58. figg. 4, 4 *a*, *b* [4].

Semiglobose, spire very short and obtuse; outside yellowish-green, with three spiral rows of pale or even white spots, each of them edged with black on the side towards the aperture, which gives them the appearance of scales; the interstices between the spiral rows marked either with similar smaller spots or with undulating vertical black lines, or with a combination of both. Columellar area not covering the whole lower face, pale fulvous; columellar edge distinctly denticulated at the middle. Operculum blackish-grey on its outer face, with whitish nucleus and blood-red edging; the two apophyses distinct, the apophysis triangular, orange.

Diam. maj. 15, min. 8½, alt. 15, alt. apert. 13, marg. col. 9, lat. areæ 5 millim.
„ 13, „ 8, „ 13, „ 11, „ 8, „ 5 „
„ 9, „ 5, „ 8, „ 7½, „ 5½, „ 3 „

Hab. W. Guatemala: mouth of the River Machaquilan (*Morelet* [1–4]); Esteros de San José and Champerico, Pacific coast (*Stoll*).

S.W. Costa Rica: Swamps of Sierpe, 5 metres above the sea, on aquatic plants, copiously (*Pittier*, April 1892); in a tributary river of the Rio Coto (*Pittier*, 1896).

This species differs from young examples of *N. punctulata* in the greater convexity of the whole shell, the distinctly prominent spire of at least two whorls, and the proportionately narrower columellar plane, which does not occupy the whole under face of the shell. A young specimen of *N. punctulata* from Cuba has diam. maj. 13, min. 7, alt. 11½, alt. apert. 11, marg. col. 7, lat. areæ 6 millim.

Among the specimens from Champerico some are normal, while others approach *N. virginea* in their more conical form and even by their markings.

4. **Neritina lineolata.** (Tab. XXVIII. figg. 2, 6.)

Nerita subviridis lineis capillaribus nigris subrecte diductis, Lister, Hist. Conch. t. 605. fig. 33 (1688) [1].

Neritina lineolata, Lamarck, Hist. Nat. Anim. sans Vert. vi. 2, p. 186 (1822) [2]; éd. 2, viii. p. 574 [3]; Menke, Synops. Moll. ed. 2, p. 48 [4] (nec Sowerby, nec Reeve).

Neritina clandestina, Menke coll. [5].

Neritina olivacea, Wiegmann, in Mus. Berol. [6] (cit. Menke, 1830).

Neritina gravis, Morelet, Test. Noviss. i. p. 27 (1849) [7]; Shuttleworth, in Bern. Mittheil. 1854 (Diagn. neuer Moll. vii.), p. 160 [8].

Neritina floridana (Shuttl.), Reeve, Conch. Icon. ix., *Neritina*, t. 18. fig. 85 (1855) [9].

Neritina reclivata (Say), var. *rotundata*, v. Mart. in Malak. Blätt. xii. p. 61 (1865) [10].

Neritina reclivata (Say), v. Mart. in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, *Neritina*,

p. 119, t. 10. figg. 7–9[11]; Strebel, Beitr. Mex. Land- und Süssw.-Conch. i. p. 60, t. 1. figg. 39, 39 *a*[12]; Fisch. & Crosse, Miss. Scient. Mex., Moll. ii. p. 480, t. 58. figg. 1, 1 *a–f*, 2, 2 *a*[13].

Riesige Neritine, Stoll, Guatemala, Reisen und Schilderungen, 1886, p. 461[14].

Shell globose, with shortly prominent spire, olivaceous-green, with very numerous fine black lines across the whorls; suture black, somewhat ragged in the last whorl. Columellar area very convex, white or pale yellowish. Size very variable.

Diam. maj. 23, min. 16, alt. 22, marg. colum. 12½, lat. areæ 9 millim. (Strebel).
„ 21, „ 14, „ 20½, „ 11, „ 8 „ (coll. Pätel).
„ 18, „ 12½, „ 17, „ 10, „ 7 „
„ 15, „ 10, „ 14½, „ 9, „ 5½ „ (coll. Albers).

Hab. Central Mexico: Sayula, State of Jalisco (*Höge*).

E. Mexico: Tampico (*Von dem Busch, coll. Dunker* and *coll. Albers*[10 11]); Rio de Tecoluta and at its mouth, the Barra del Rancho Nuevo (*Deppe & Schiede*[10]); Misantla, or more probably Jicaltepec, at the mouth of the Rio de Misantla (*Strebel*, fig. 39 *a*[12]); Vera Cruz (*Friedel*[10]), especially in the small stream of Tenoya, near its mouth, on aquatic plants, stones, rotten wood, and planks, and in the brook of Vergara, about two miles from the town (*Strebel*[12]); Cerro de Palma, near Cordova (*Höge*); San Carlos, nearly due east of Oaxaca (*Höge*).

S.E. Mexico: Tabasco (*Höge*).

Yucatan: Island of Carmen (*Morelet*[13]).

British Honduras: Belize (*Morelet*[7]; *Bocourt*[13]).

E. Guatemala: Yzabal, on the Lake of Yzabal or Golfo Dulce (*Stoll*).

The general colour of the shell varies from a pale greyish-green to a darker olivaceous or even brownish-green: the black lines are sometimes very fine and not easily seen; they run obliquely from above and behind to below and before, but with some angles and flexuosities, which are the same in neighbouring lines.

Var. *reclivata*.

Theodoxus reclivatus, Say, Journ. Acad. Phil. iii. p. 257 (1822)[15].

Nerita reclivata, var. ovale, oblongue, Récluz, Rev. Zool. 1841, p. 338[16].

Neritina reclivata (Say), Sowerby, Thes. Conch. ii. p. 533, t. 116. figg. 240, 241[17]; Reeve, Conch. Icon. ix., *Neritina*, t. 8. fig. 34[18]; v. Mart. Malak. Blätt. xii. p. 61 (1865)[19]; Strebel, loc. cit. p. 61, t. 1. fig. 39 *b*[20]; Troschel, Gebiss der Schnecken, ii. p. 177, t. 16. fig. 10 (radula)[21].

Neritella reclivata, Binney, Land and Freshw. Shells of N. Am. iii. p. 103, figg. 205, 206 (operculum), 207 (radula)[22].

Neritina reclivata, var. B. *conoidalis*, v. Mart. in Martini & Chemnitz, loc. cit. p. 119[23].

Neritina microstoma, d'Orbigny, in Ramon de la Sagra's Hist. fis. polit. y nat. de Cuba, Moluscos, p. 177, t. 17. fig. 37[24]; Pfr. Malak. Blätt. v. p. 49 (1858)[25].

Conoidal, somewhat acorn-shaped, the last whorl narrowed conspicuously in its upper half and the spire a little more produced; otherwise not different from the type, and connected with it by intermediate forms.

Diam. maj. 15, min. 10½, alt. 16, marg. colum. 7½, lat. areæ 6 millim.
„ 17, „ 13, „ 20, „ 8, „ 6 „
„ 10, „ 8, „ 15, „ 6½, „ 4 „
18, „ 15, „ 23, „ 10, „ 7 „ (Tampico).

Hab. South-eastern United States: Alabama, S. Carolina, Florida.
E. Mexico: Tampico (*coll. Dunker*); Rio de Tecoluta, with the typical form (*Deppe & Schiede* [19] [23]); Vera Cruz, with the typical form, but only one specimen (*Strebel* [20]); San Carlos, one specimen among four globose ones (*Höge*).
E. Guatemala: Rio Dulce, at Livingston (*Stoll*).
Antilles: Cuba (*d'Orbigny* [24]; *Pfeiffer* [25]; *Gundlach*).

This is the prevailing form in Florida and Cuba, where specimens are also found approaching more or less closely to the typical *N. lineolata*, which is the commonest form in Mexico.

Var. *reticulata*. (Tab. XXVIII. fig. 7.)

Nerita reticulata, Lister, Hist. Conch. t. 605. fig. 28 (1688) [26].
Neritina reticulata, De Cristofori et Jan, Catalogus Rer. Nat. 1832, p. 7 [27]; Mantissa, Cat. p. 4 [28] (nec *N. reticulata*, Sowerb. P. Z. S. 1832, Reeve, &c.; nec *reticulata*, Quoy et Gaimard, 1834 = *dubia*, Chemn.).
Neritina reclivata, var. *reticulata*, v. Mart. in Martini & Chemnitz, loc. cit., *Neritina*, p. 120, t. 10. fig. 10 [29]; Fisch. & Crosse, loc. cit. p. 481, t. 58. figg. 3, 3 *a* [30].
Neritina verriculum, Récluz, in litt.[31]

The black lines forming a regular network, and somewhat thicker and less numerous than in the typical form. General shape varying between globose and conoidal.

Hab. E. Mexico: Tampico (*coll. Dunker*); Vera Cruz, with the typical form (*coll. Dunker* [29]).
British Honduras: Belize (*Mus. Berol.* [29]; *Bocourt* [30]).
E. Guatemala: Lake of Yzabal (*Stoll*); Rio Dulce, at Livingston (*Stoll*).
Antilles: Cuba, especially at Manzanillo, where it is the predominant form, and in the Rio Cauto, where it has been found among a larger number of the var. *reclivata* (*Gundlach, in Mus. Berol.*); Jamaica [26].

Some individuals show a transition from the reticulated to the lineated form. (See Tab. XXVIII. fig. 1.)

Among twenty-two examples from Florida, now before me, there is not one with reticulated coloration.

Var. *parcepicta*, n. (Tab. XXVIII. figg. 1, 3, 4, 5.)

Neritina reclivata, var. *striolata* (Récluz), v. Mart. in Martini & Chemnitz, loc. cit., *Neritina*, p. 120 (part.), t. 13. fig. 12 [32].

The black lines thicker and fewer in number, and somewhat widely separated.
Diam. maj. 15, min. 19, alt. 17 millim.
„ 8, „ $5\frac{1}{2}$, „ 9, marg. col. 6, lat. areæ 3 millim.

Hab. E. Guatemala: Rio Dulce, at Livingston (*Stoll*).

This is an individual variation rather than a distinct variety, as specimens are sometimes found with the regular network of the var. *reticulata*, passing by degrees into the

irregular and more isolated streaks of the last whorls (see fig. 5); sometimes two of the streaks are placed close together and each separated by wider interstices from the others (see fig. 3).

The true *N. striolata*, Lister, Hist. Conch. t. 604. fig. 29; Récluz, Rev. Zool. 1841, p. 337; Sow. Thes. Conch. figg. 98, 99; Reeve, fig. 100, from Venezuela and Guiana, seems to be an analogous variation of *N. zebra*, Lam., characterized by a similar deficiency and irregularity of the streaks; but it is of a generally broader shape than the Central-American forms, the spire is shorter and flatter, and the last whorl shows a very slight subangulated swelling below its greatest circumference.

5. **Neritina cassiculum.** (Tab. XXVIII. figg. 9, 9 *a*.)

Neritina cassiculum, Sowerby, Conch. Illustr. sp. no. 55, fig. 55 (1837) [1]; Thes. Conch. ii. p. 521, t. 111. fig. 192 [2]; Menke, Zeitschr. f. Malak. 1851, p. 166 [3]; Reeve, Conch. Icon. ix., *Neritina*, t. 26. fig. 118 [4]; P. Carpenter, Cat. Mazatlan Shells, p. 258 [5]; Binney, Land and Freshw. Shells of N. Am. iii. p. 105, fig. 210 (copied from Sowerby) [6]; Fisch. & Crosse, Miss. Scient. Mex., Moll. ii. p. 484, t. 58. figg. 8, 8 *a*, *b* [7].

Peculiarly globose, rather swollen in the upper part of the last whorl; spire a little prominent, but nearly flat at the top, very obtusely subangulated in the lower half of the last whorl. Yellowish-green, with very numerous white spots, which have a black point towards the aperture. Columellar plane a little swollen, white, orange at its outer border. Columellar margin not sinuated in the middle, with numerous (11) small obtuse teeth, one of the upper ones at the upper third of the margin twice as broad as the rest.

Diam. maj. 17, min. 10½, alt. 17, marg. col. 10½, lat. areæ 6–7 millim.

Hab. N.W. Mexico: Mazatlan (*Melchers* [3]; *Reigen* [5 7]).

In general appearance and colour this species very much resembles *N. virginea*, var. *listeri*, Pfr., from Cuba, but differs from it in the flatter top and the slight angulation in the lower part of the last whorl. P. Carpenter [5] suggests that it may be a variety of *N. picta*, but he himself mentions the difference in the form of the teeth of the columellar margin. I have not yet seen the operculum of *N. cassiculum*, but, to judge from the formation of the columellar margin, it is probably like that of the subgenus *Neritæa*, *i. e.* with the two apophyses completely separated, whereas in *N. picta* they are united by a septum, which is the character of the subgenus *Clithon*.

When I wrote my monograph of *Neritina*, in the second edition of Martini and Chemnitz's work, I had not seen a specimen of the present species from Mazatlan, and so I identified it with the reticulated variety of *N. reclivata*. Two examples from Mazatlan, from Dunker's collection, are, however, now before me, and from these the above description has been taken. Nevertheless, it is not quite certain whether the original *N. cassiculum* of Sowerby, the habitat of which is unknown, is really the Mazatlan species or the variety *reticulata* of *N. reclivata*.

6. **Neritina virginea,** var. **listeri.**

Nerita maculis ad interstitia latis and *N. major*, Lister, Hist. Conch. t. 604. figg. 26, 30 (1688) [1].

Nerita virginea (Lam.), Chemnitz, Syst. Conch.-Cab. (ed. 1) ix. p. 72, t. 124. fig. 1086 [2].

Neritina virginea, Sowerby, Thes. Conch. ii. p. 590 (part.), t. 116. fig. 232[3]; Reeve, Conch. Icon. ix., *Neritina*, t. 21. fig. 92 *c*[4]; d'Orbigny, in Ramon de la Sagra's Hist. fis. polit. y nat. de Cuba, Moluscos, p. 174 (part.)[5]; Gloyne, in Journ. de Conch. xx. p. 37 (1872)[6].

Neritina virginea, var. *listeri*, v. Mart. in Malak. Blätt. xii. p. 62 (1865)[7]; in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, *Neritina*, p. 123, t. 14. figg. 1–3, 10[8].

Neritina listeri, Pfr. in Archiv f. Naturg. vi. p. 255 (1840)[9]; Shuttleworth, Mittheil. nat. Ges. Bern, 1854 (Diagn. neuer Moll. vii.), p. 160[10]; Tate, in Amer. Journ. of Conch. v. p. 155 (1870)[11].

Larger and more globose than the typical form, yellowish-green (bleached violet), with crowded zigzag lines and scattered small white black-edged spots. Columellar plane white, more or less yellow or even orange outwards.

Diam. maj. 22½, min. 14, long. 21, marg. col. 12½, lat. areæ 9½ millim.

Hab. E. Nicaragua: throughout the river San Juan, at the rhizomes of aquatic plants, very abundantly, but also in Greytown harbour with *Planorbis tumidus* (*wyldi*?) at localities where the water is alternately brackish and fresh, according as to whether the tide is flowing or ebbing (*Tate*[11]).

Antilles: Cuba (*Pfeiffer*[9]; *d'Orbigny*[5]; *Gundlach*[8]); Puerto Rico (*Blauner*[10]); Jamaica (*Riise*[8]; *Gloyne*[6]).

This is the freshwater variety of the well-known *N. virginea*, which is more common in brackish water, but there smaller, more vividly and variously coloured, with less distinct periostracum, according to the observations of d'Orbigny[5], Gloyne[6], and Gundlach[8].

Dubious Species.

Neritina sargi.

Neritina sargi (Staudinger, in litt.), in Paetel's Cat. Conchylien-Sammlung, ed. 4, p. 527 (1888)[1]; Crosse & Fisch. Journ. de Conch. xl. p. 296 (1892)[2]; Miss. Scient. Mex., Moll. ii. p. 475, t. 58. figg. 6, 6 *a–d*[3].

Hab. ? Guatemala[2–4].

Fischer and Crosse suggest that this so-called species, quoted as from Guatemala (*Sarg*) in Paetel's Catalogue, may be a young shell of the subgenus *Alina*; but having examined the operculum of one of Paetel's specimens, I find that the apical apophysis is scarcely developed, as in the subgenus *Theodoxus*, which chiefly comprises European forms, and is not known from the New World. As there are numerous mistakes in the localities quoted in the above-mentioned Catalogue, the Guatemalan habitat must be regarded as doubtful, though Mr. Sarg resided for many years in Guatemala.

Neritina pulchra.

Neritina pulchra, Sowerby, Conch. Illustr. no. 57. fig. 59[1]; Thes. Conch. ii. p. 539, t. 112. figg. 89, 90[2]; Deshayes, in Lamarck's Hist. Nat. Anim. sans Vert. éd. 2, viii. p. 589[3]; Récluz, Journ. de Conch. i. p. 151[4]; Reeve, Conch. Icon. ix., *Neritina*, t. 25. fig. 111[5];

P. Carpenter, Rep. Moll. N.W. Amer. p. 188 (1856) [6]; v. Mart. in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, *Neritina*, pp. 116, 280, t. 13. figg. 3, 4 [7].

Hab. ? Panama [2 5].

I have examined the shell and operculum of a specimen given by Cuming to Consul Gruner in Bremen, and now in the Berlin Museum, and feel much inclined to adopt Récluz's [4] view that it is identical with *N. variegata*, Less., from the Malayan Archipelago. The locality "Panama" is not given in the earlier records [1 3], and the species is not included in C. B. Adams's list of Panama shells.

Neritina michaudi.

Neritina michaudii (Récluz), Sowerby, Thes. Conch. ii. p. 529, t. 112. figg. 108, 109, t. 115. figg. 217, 218 [1]; Reeve, Conch. Icon. ix., *Neritina*, t. 25. fig. 109 [2]; P. Carpenter, Rep. Moll. N.W. Amer. pp. 189, 291, 322 (1856) [3].

A species of British India, incorrectly recorded from Panama by Sowerby and Reeve (see my Monograph of this genus, p. 191).

Neritina mexicana.

Neritina mexicana (Parreyss), in Paetel's Cat. Conchylien-Sammlung, ed. 4, p. 524 (1888) [1].

Hab. Mexico [1].

The specimen in Paetel's collection is identical with the European *N. danubialis*, Meg.

BIVALVIA.

Shells composed of two corresponding halves (valves), a right and a left.

Also known under the names Conchifera (*Lamarck*), Lamellibranchia (*Cuvier*), Dithyra (*Turton*), and Pelecypoda (*Goldfuss*).

As there is still much difference of opinion among conchologists regarding the larger subdivisions of the Bivalvia, we prefer to name only the families; very few of them are represented in freshwater.

Fam. DREISSENIDÆ.

Characters the same as those of the only genus.

DREISSENA.

Dreissena, Van Beneden, Ann. Sciences Nat. (2) iii. p. 193 (with description of the living animal) (January 1835).

Tichogonia, Rossmässler, Icon. Land- und Süsswasser Mollusken, i. 1, p. 112 (April 1835).

Dreissensia, Fischer & Crosse, Miss. Scient. Mex., Moll. ii. p. 497.

Form of the shell unequilaterally triangular, pointed before, rounded behind, as in

the common Mussel (*Mytilus*); inside, a peculiar wall (septum) in the umbonal region. Two adductors, the anterior very small; no pallial sinus. Borders of the mantle closed in half the length of the underside, leaving an opening for the cylindrical foot, which spins a byssus, like the common Mussel. Ventral margin of the shell somewhat asymmetrical.

Found in various parts of the world, chiefly in tropical and subtropical regions; one species widely spread in Europe by human intercourse, by vessels and rafts, since 1824.

I retain the usual spelling, *Dreissena*, although the individual after whom it was named called himself "Dreissens"; but for the sake of euphony it is perhaps permissible to alter the spelling somewhat, as in *Rissoa*, Desmoulins, for *Rissoia*, *Draparnaldia*, Bory St. Vinc., for *Draparnaudia*, &c.

Subgen. Praxis.

Praxis, H. & A. Adams, Gen. Moll. ii. p. 522 (1858).

A spoon-like appendage at the upper end of the septum.

Chiefly American.

1. **Dreissena sallei.** (Tab. XXXII. figg. 4, 5.)

Dreissena sallei, Récluz, Rev. Zool. 1849, p. 69 [1]; Journ. de Conch. iii. p. 255, t. 10. fig. 9 (1852) [2]; Dunker, De Septiferis et Dreissensiis, p. 18 (1855) [3].

Dreissensia sallei, Fisch. & Crosse, Miss. Scient. Mex., Moll. ii. p. 504, t. 62. figg. 4, 4 *a*, *b*, 5 [4].

Mytilus sallei, Reeve, Conch. Icon. x., *Mytilus*, fig. 44 (1858) [5].

Tichogonia sallei, Clessin, in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, Mytiliden, p. 17, t. 12. figg. 13, 14 (1889) [6].

Moderately convex, somewhat roughly striated, dull, pale greyish-brown, either unicolorous, or with darker shades parallel to the lines of growth, or with scattered darker brown spots arranged along the lines of growth; a distinct ridge separating the sides from the base only near the summits, evanescent in the greater part of the shell; summits bent down; fore half of the dorsal margin more or less ascending in a slightly convex line, hinder half less steeply descending, hinder extremity rounded; ventral margin concave only in its fore half. Angle between the fore and hinder parts of the dorsal margin in most specimens very obtuse, rarely more distinct. Inside pale violet, with darker blotches, especially along the pallial line; septum roundly notched, with a somewhat triangular (rather than spoon-shaped) appendage, scarcely excavated, directed towards the lateral wall of the shell.

a.	Long.	19–23,	alt.	13–14,	diam.	?	millim.
b.	,,	23,	,,	$13\frac{1}{2}$,	,,	9	,,
c.	,,	22,	,,	10,	,,	9	,,
d.	,,	26,	,,	13,	,,	9	,, (Fig. 5.)
e.	,,	19,	,,	12,	,,	?	,,
f.	,,	20,	,,	$12\frac{1}{2}$,	,,	$7\frac{1}{2}$	,, (Fig. 4.)

a. Measurement given by Récluz [1]; *b*. Fischer & Crosse's fig. 4; *c*. Specimen from Guatemala in Dunker's collection; *d* and *f*. Specimens from Honduras; *e*. Fischer & Crosse's fig. 5; *e* and *f* are more elevated specimens, with distinct dorsal angle.

Hab. E. Guatemala: Rio Dulce and the Lake of Yzabal, in freshwater, attached to rocks and to one another (*Sallé* [1–6]).

Honduras (*coll. Dunker*).

Récluz[2] says that the animal pierces the rocks; it is more probable, however, that it penetrates only the holes that are already there, and adapts its further growth to the surrounding space.

A species from the Rio Hacha, Colombia (in the Berlin Museum), differs from *D. sallei* in being more elongate and a little more flattened, with the summits less bent down, the colour paler, and the appendage of the septum usually more excavated. *D. domingensis*, Récluz, from Haiti and Venezuela, is of smaller size and more convex, with the summits also less bent down and the appendage of the septum more excavated. There are, however, so many individual variations in a set of shells collected at the same locality, that all these differences hold good only for the majority of specimens from any one place.

Fam. UNIONIDÆ.

Freshwater Bivalves of moderate or large size, with distinct greenish, brown, or blackish periostracum (epidermis); inside more or less pearly, with two nearly equal impressions of the adductor muscles, one before and the other behind, and some smaller impressions of the pedal muscles. Borders of the mantle for the greater part disunited, united in the posterior dorsal margin only: apparently two round holes for the entrance and exit of water; but only one of them, the upper, really closed all round, the other, lower, continuous with the general cleft of the mantle and fringed with cirri. Shells generally longer than high, with or without teeth in the hinge.

Found on all continents, even in Australia, and also in large or moderately large islands, such as Great Britain, Cuba, Sumatra, Java, Borneo, and New Guinea; but wanting on smaller islands, even in Jamaica, Haiti, and Celebes.

UNIO.

Unio, Retzius, Dissert. Hist.-Nat. sistens nova Test. gen. resp. Philipsson, p. 16 (1788) (part.); Bruguière (1792), Schumacher (1817) (as at present restricted), &c.

Shell solid, usually oblong or elongated, shorter and rounder before the summits, lengthened and often more or less pointed behind them; summits, if not worn, sculptured. Hinge toothed: before the summits one or two teeth (the anterior one much the smaller when present) in the right, two nearly equal in the left valve, triangular or compressed, lamelliform, mostly furrowed and crenulated (called cardinal teeth by most authors and anterior lateral teeth by Crosse and Fischer); behind the summits one elongated, compressed, lamelliform tooth reaching behind the hinder end of the ligament in the right valve, two such teeth in the left valve. Sexes separate; female shells sometimes more convex.

For the history of the genus and the anatomy, see Fischer and Crosse, Miss. Scient. Mex., Mollusques, ii. pp. 538 *et seq.*

Geographical distribution:—On all continents and some islands; northwards it extends to the central part of Sweden (province Dalarne) and to Canada, southwards to

the Cape Colony, Tasmania, and Patagonia. In Central Europe *Unio* reaches no higher than the great lakes at the foot of the Alps. It has a few representatives on the elevated plateau of Mexico, but is wanting, so far as we know, in the high central parts of Guatemala and Costa Rica; it is common, in various subgenera, on the Atlantic slope, less so on the Pacific slope, probably because the former has larger rivers and more low lands.

H. v. Ihering has discovered that in all the South-American species which he has been able to examine the eggs are hatched within the inner gills, whereas it is well known that in the European and North-American forms this is done in the outer gills [see Archiv für Naturg. lix. p. 47 (1893)]. It is therefore very desirable that the eggs of living specimens of the Mexican and Central-American forms should be examined, and also to ascertain whether the young ones, after having left the gills of the mother, attach themselves to the fins of fishes by a byssal filament, as has been stated to be the case with European species. Hitherto no structural character has been found to distinguish the South-American forms from the rest of the genus; the summits of most of them are radiately sculptured, but this is also the case in many Indian species, the group of *Unio corrugatus*, Müll.

The nearly allied genus *Margaritana*, Schumacher (without posterior lamelliform teeth), in its restricted sense palæarctic and nearctic, but represented in South America by *Monocondylea*, d'Orb., and in the Malayan region by *Pseudodon*, Gould, is altogether wanting in Mexico and Central America.

The species of the genus *Unio* are very numerous and many subgenera have been proposed by various authors for their reception. Fischer and Crosse admit for Mexico and Guatemala alone (Salvador, Nicaragua, Costa Rica, and Panama excluded) nineteen subgeneric sections, most of them first proposed by themselves without regard to foreign forms, and containing altogether fifty-six species. I shall follow their classification with some modifications. Eleven subgenera are here adopted, and in the characters and distribution of each given below I have endeavoured to show the relationship of the Mexican and Central-American forms with those of North or South America.

I. Crenodonta *, Schlüter, Verz. meiner Conch. p. 33 (part.) (Halle, 1836) (restricted by Mörch, Cat. Yoldi, 1853, p. 45) : *Plectomerus*, Conrad, Proc. Acad. Phil. vi. p. 260 (1853); Fischer & Crosse, Miss. Scient. Mex., Moll. ii. p. 555. no. 3 (1893) : *Amblema*, Rafinesque (1820) (part.). Non—Symphynote, plicate, quadrate *Uniones*, Lea, Synops. fam. Naïad. ed. 1, p. 12 (1836), ed. 3, p. 20.—Shell with strong plaits, radiating from the summits, the strongest running obliquely to behind and below; very solid and large-sized; cardinal teeth strong.

Several species in North America, especially in the Ohio and neighbouring rivers. *U. nicklinianus* in N.E. Mexico; *U. digitatus* and *U. stolli* in Guatemala. Wanting in

* Fischer, Manuel de Conch. p. 1000 (1885), quotes *Unio securis* as type of *Crenodonta*, Schlüter; but this is only the third species in Schlüter's list, *plicatus* being the first, and, moreover, Mörch restricted the name to *U. plicatus* in 1853.

South America. The strongly tuberculated species of *Unio* forming the subgenera *Quadrula* and *Rotundaria*, Raf., Agass., *Cyprogenia* and *Tritogenia*, Agass., well represented in North America, are absent in Mexico.

II. Psoronaias, Fischer & Crosse, loc. cit. p. 556. no. 6 (1893) : *Iridea*, Swainson (1840) (part.). —Shell with granulated sculpture over the greater part, solid, and with strong cardinal teeth.

(*a*) *U. semigranosus, psoricus, corium, morini, crocodilorum.* (*b*) Very compressed: *U. ostreatus* and *percompressus*.

Known from N.E. Mexico to Guatemala, absent in North America, represented in the northern part of South America by *U. granosus*, Brug., from Cayenne.

III. Arotonaias, n.—Shell triangular, rather compressed, and of comparatively small size, with strong concentric, often somewhat irregular, sculpture and strong teeth. In some species the summits are unequal.

U. cyrenoides, newcombianus, gabbianus, encarpus, caldwelli, imbricatus, granadensis, aratus.

Nicaragua and Panama. I know no similar forms, either from North or South America.

IV. Pleurobema*, Rafinesque (1820), Agassiz (1852).—Shell solid, triangular or obliquely quadrate, often biangulated behind, without peculiar sculpture; summits prominent; cardinal teeth moderately thick, furrowed and crenulated.

To this North-American subgenus, near *U. rubiginosus*, Lea, I refer the Mexican *U. couchianus* and the Guatemalan *U. spheniopsis* and *U. usumacintæ*: Fischer & Crosse (1893) propose for each of them a distinct subgenus, viz. *Pachynaias* for *U. spheniopsis*, *Amphinaias* for *U. couchianus*, while *U. usumacintæ* is included by them in *Psoronaias*.

V. Sphenonaias, Fischer & Crosse, loc. cit. p. 557. no. 18 (1893).—Shell oblong, cuneiform, swollen in the fore part, lengthened and attenuated behind; cardinal teeth rather thick.

U. liebmanni, acutirostris, goascoranensis, and *tehuantepecensis*.

So far as at present known, confined to Mexico, Guatemala, and Honduras.

VI. Nephronaias, Fischer & Crosse, loc. cit. p. 556. no. 12 (1893).—Elongated, compressed, rather smooth, but not shining; summits much advanced; ventral margin mostly sinuated, hinder end rounded; cardinal teeth moderate.

U. aztecorum, popei, poeyanus, from Mexico. The Mexican *U. strebeli* and the Guatemalan *U. microdon* may also be placed here, although somewhat differing. The North-American type of *Cunicula*, Swains. (1840), *U. fasciolaris*, Raf. (*phaseolus*, Hildreth, *planulatus*, Lea), resembles them in several respects.

VII. Simonaias, Fischer & Crosse, loc. cit. p. 557. no. 17 (1893).—Shell with distinct concentric furrows; oblong or elongated, summits advanced, ventral margin mostly straight; cardinal teeth rather strong.

U. cuprinus, dysoni, macnieli, yzabalensis, championi, hjalmarsoni, nuculinus.

S.E. Mexico to Honduras and Nicaragua.

VIII. Lampsilis †, Rafinesque (1820) (*U. cardium*, Raf. = *U. ventricosus*, Barnes, and *U. ovatus*,

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* Fischer, Manuel de Conch. p. 1000 (1885), incorrectly quotes *Uniopsis*, Swains. (1840), as a synonym of *Pleurobema*: Swainson, it is true, named *U. mytiloides* as belonging to it (Malacol. p. 382); nevertheless he meant a species without lateral teeth, as is clear by his remarks on p. 289, and by the position he assigns to the genus among the Alasmodontinæ, p. 382.

† According to the author, this name is modified from "Lasma-campsilis, lama flexualis" (more correctly ἔλασμα καμψὸν), a very peculiar contraction indeed.

Say), Agassiz (1852) : *Æglia*, Swainson (1840) (*U. ovatus* and *U. siliquosus*) (nec *Æglea*, Leach, 1820) ; *Disconaias, Cyrtonaias, Actinonaias*, and *Amygdalonaias*, Fischer & Crosse, loc. cit. p. 556, nos. 4, 8, 13, 14 (1893).—Shell ovate or oblong, smooth, shining; summits moderately prominent; ventral margin usually rounded; cardinal teeth rather strong; posterior lamellæ arcuated.

U. discus, tampicoensis, berlandieri, alienigenus, sapotalensis, computatus, cognatus.

North America, N.E. and E. Mexico.

IX. Elliptio, Rafinesque (1820) (*U. niger*, Raf.=*U. cuneatus*, Barnes) : *Unio*, s. str., Agassiz, Archiv für Naturg. xviii. p. 50 (1852) ; *Cænonaias* and *Leptonaias*, Fischer & Crosse, loc. cit. pp. 556, 557, nos. 11, 16 (1893).—Oblong, obtusely keeled and angulated behind, smooth, solid; cardinal teeth moderate.

U. tamaulipanus, rubicundus, pliciferus, ravistellus, opacatus, mexicanus, sallei, medellinus, æruginosus, radiatulus, rowelli, guatemalanus.

North America, N.E. Mexico, Guatemala.

X. Uniomerus, Conrad, Proc. Acad. Phil. 1853, p. 268 (*U. declivis* and *U. camptodon*, Say) : *Uniomerus* and *Mesonaias*, Fischer & Crosse, loc. cit. p. 556, nos. 9, 10 (1893).—Shell oblong, smooth, moderately convex, rather thin; cardinal teeth compressed, lamelliform.

U. manubius, explicatus.

North America, Central and S.E. Mexico.

Anodontina, Schlüter (1838), type *U. teres*, Raf.=*U. anodontoides*, Lea, differs from *Uniomerus* in having a shorter and stouter cardinal tooth and a thicker shell.

XI. Metaptera, Rafinesque (1820) (*U. alatus*, Say), Agassiz (1852) : *Symphynota*, Lea (part.) ; *Delphinonaias* and *Phyllonaias*, Fischer & Crosse, loc. cit. p. 555, nos. 1, 2 (1893).—Compressed, distinctly winged, both shells grown together in the wing; cardinal teeth compressed.

U. largillierti, paludosus, scutulatus, and, somewhat different by the more elongate form and very prominent wing, *U. delphinulus*.

N. America, Guatemala and Yucatan.

These remarks on the subgenera of *Unio* represented within our limits afford the following facts regarding the zoo-geographical distribution of the species :—

(1) A large number of the species, not only from Mexico, but also from Guatemala, are nearly allied to North-American ones and there are no similar forms in South America.

(2) That some subgenera seem to be peculiar to Mexico and Guatemala, without analogous forms either in North or South America, and this is also the case with the Nicaraguan section *Arotonaias*.

(3) That *Psoronaias* is the only section which is also represented in the northern part of South America.

(4) That the group with close radial sculpture of the summits, as *U. dolodon*, Lam., *U. multistriatus*, Lea, &c., from Brazil, has no representative in Central America, so far as at present known.

Comparative Table of the Species of *Unio*.

Nomen.	Forma.	Pars postica.	Sculptura (Coloratio).	Dentes cardinales.	Facies interna.	Vertices in long.	Long.	Alt. vert.	Alt. alæ.	Diam.	Patria.
I. Crenodonta, Schlüter.							mm.	mm.	mm.	mm.	
digitatus, *Morel.*	oblongo-trapezoidea, marg. dors. horizontali, ventr. subsinuato; convexiuscula.	declivi-rotundata.	plicis validis, retrorsum radiantibus, infimis majoribus.	trigoni, crassi, rugosi.	albida.	$\frac{1}{4}$	114–130	75–81	82–86	46	N.E. Mexico?, N. Guatemala.
stolli, *v. Mart.*	subtrapezoidea, antice brevissima, marg. dors. post vertices ascendente, ventr. subrecto; compressa.	alata, dein valde declivis.	plicis validis, retrorsum radiantibus, sæpe furcatis, infimis minoribus, subverticalibus.	,,	alba.	$\frac{1}{6}$–$\frac{1}{8}$	128–160	62–78	93–128	34	N. Guatemala.
nicklinianus, *Lea*	subcircularis, marg. dors. post vert. valde ascendente, ventr. arcuato; convexiuscula.	,,	plicis validis, retrorsum radiantibus planis, infra obsoletis.	,,	albida.	$\frac{1}{7}$–$\frac{2}{7}$	144–148	74–85	115–121	52	N.E. Mexico.
II. Psoronaias, Fisch. & Crosse.											
semigranosus, *Busch* ...	oblongo-ovata, marg. ventr. parum arcuato.	rotundata.	superne granulata.	trigoni, modice crassi.	sordide purpurea.	$\frac{3}{8}$	89–106	54–67	52–60	38	N.E. & S.E. Mex.
——, var. testudineus, *Morel.*	ovato-circularis, marg. ventr. valde arcuato.	,,	,,	trigoni, subcompressi.	salmonea.	$\frac{4}{9}$	91	70	62	34	N.W. Guatemala.
——, var. distinctus, *Cr. & F.*	oblongo-ovata, marg. ventr. antice valde ascendente, dein horizontali; tumidula.	declivi-rotundata.	superne reticulato-granulata.	trigoni, validi.	fusco-cuprea.	$\frac{1}{3}$	79	50	42	33	E. Mexico.
psoricus, *Morel*.....	trigono-rhomboidea, marg. ventr. sinuato; inflata.	conspicue deflexa.	superne granulata.	trigoni, crassi, rugosi.	purpurea vel albida.	$\frac{1}{3}$–$\frac{2}{7}$	70–84	56–63	47	39–43	N. Guatemala.
——, var. pigerrimus, *Cr. & F.*	rotundato-elliptica.	rotundata.	granis majoribus, arcuatim seriatis.	,,	subroseo-albida.	$\frac{2}{7}$	59	38	36	27	Mexico.
corium, *Sow.*.	elliptico-oblonga, marg. ventr. parum arcuato.	subrostrata.	superne granulata, granulis arcuatim dispositis.	subtrigoni, sat crassi, rugosi.	sordide purpurea.	$\frac{2}{7}$	97–103	61–62	59	$38\frac{1}{2}$	S.E. Mexico.
morini, *Morel.*	elliptico-elongata, antice obtusa, marg. ventr. subrecto; ventricosa.	rostrata, deflexa.	minute granulata.	trigoni, crassi, sulcati.	cærulescenti-albida vel purpurea.	$\frac{1}{4}$	75	47	42	28	N. Guatemala.

crocodilorum, *Morel.* .	cuneiformis, antice bene inflata, rotundata, marg. ventr. medio et post subrecto.	deflexe rostrata.	minute tuberculata.	compressi, sat validi, rugosi.	fusco-aurea vel rosea, raro alba.	$\frac{1}{3}$–$\frac{2}{7}$	70–96	40–55	34–50	30–42	N. Guatemala.
——, var. semipustulatus, *F. & Cr.*	,,	,,	tantum superne tuberculata.	,,	cærulescenti-alba.	$\frac{1}{3}$	74	45	40	33	N. Guatemala.
——, var. præstrictus, *F. & Cr.*	cuneiformis, antice bene inflata, rotundata, marg. ventr. medio et post subrecto; brevior.	,,	minute tuberculata.	,,	livido-rubens.	$\frac{2}{7}$	60	40	36	31	N. Guatemala.
ostreatus, *Morel.*	triangularis, modice compressus.	valde declivis, infra subsinuata.	concentrice granuloso-cingulata.	crassi, obliqui.	aurantia.	$\frac{3}{8}$	64	60	45	29	N. Guatemala.
percompressus, *v. Mart.*	cordata, rarius triangularis; percompressa.	rotundata, infra plerumque subsinuata.	concentrice ruditer plicosa.	crassi, trigoni, perpendiculares.	purpurea, aurantia vel alba.	$\frac{2}{7}$–$\frac{1}{3}$	94–98	73–92	64–67	24–28½	N. Guatemala.
III. Arotonaias, v. Mart.											
cyrenoides, *Phil.*	subinæquivalves: triangularis, inflata, marg. ventr. valde arcuato.	declivi-rostrata, inferne subsinuata.	concentrice corrugato-sulcata.	trigoni, validi, sulcati.	pallide rubens vel alba.	$\frac{1}{3}$	36–49	29–36½	22–31	16–32	Centr. Nicaragua.
newcombianus, *Lea* ...	subinæquivalves: trigono-circularis, sat compressa, marg. ventr. arcuato, saccato.	brevis, obtuse angulata.	concentrice sulcata.	subcompressi, obliqui.	albida.	$\frac{2}{7}$	39–44	32–36	22–34	16–18	Centr. Nicaragua.
gabbianus, *Lea*	subinæquivalves: trigono-ovata, marg. ventr. æqualiter arcuato.	subtruncato-rostrata, obtuse carinata.	,,	compressi, debiles.	,,	$\frac{1}{3}$	34–39	25–26	22–27	18½	Centr. Nicaragua.
encarpus, *Lea*	trigono-rotundata, tumida, marg. ventr. leviter arcuato.	truncato-rostrata, carinata.	concentrice corrugato-sulcata.	,,	,,	$\frac{1}{3}$	36	26	22	19	Centr. Nicaragua.
imbricatus, *Mörch*.....	ovata, antice obtuse angulata, marg. ventr. parum arcuato.	rotundato-angulata, sulcis descendentibus obsoletis.	ruguloso-lirata, postice granulosa.	trigoni, subcompressi.	argentea.	?	31	23	?	17	Nicaragua.
caldwelli, *Lea*	ovato-trigona, marg. ventr. arcuato.	obtuse declivi-rostrata.	concentr. sulcata.	trigoni, validi, crenulati.	salmonea.	$\frac{1}{3}$	60	25½–40	26½–35	13–31	S. Panama.
granadensis, *Lea*	ovato-cuneata, antice rotundata, marg. ventr. paulum arcuato.	declivi-rostrata.	,,	subcompressi.	albida.	$\frac{1}{3}$	37	21	19	16½	Centr. Nicaragua.
aratus, *Lea*	triangulari-elliptica, antice rotundata, marg. ventr. subrecto.	deflexe rostrata; obsolete bilirata.	,,	crassiusculi, crenulati.	alba.	$\frac{1}{3}$	18–25	10½–16	10–13	8–13	Centr. Nicaragua.

Comparative Table of the Species of *Unio* (*continued*).

Nomen.	Forma.	Pars postica.	Sculptura (Coloratio).	Dentes cardinales.	Facies interna.	Vertices in long.	Long.	Alt. vert.	Alt. alæ.	Diam.	Patria.
IV. Pleurobema, Raf.							mm.	mm.	mm.	mm.	
spheniopsis, *Morel.* ...	subtrigona, inflata, marg. ventr. subrecto.	truncata, oblique carinata.	concentrice sulcata.	subtrigoni, crassi, rugosi.	alba, margaritacea.	$\frac{2}{5}$	51	43	32	37	N. Guatemala.
couchianus, *Lea*	quadrato-cordata, marg. ventr. arcuato et postice sinuato.	truncata, oblique tumido-carinata.	postice plicalis brevibus obliquis.	trigoni, crassi, rugosi et crenulati.	argentea.	$\frac{1}{3}$	45	32	30	24	N.E. Mexico.
usumacintæ, *Cr. & F.*.	triangulari-cordata, inflata.	valde declivis, bicarinata, infra subsinuata.	concentrice subgranuloso - plicata.	validi, obliqui.	alba, centro pallide roseo.	$\frac{1}{3}$	47	42	34	33	N. Guatemala.
V. Sphenonaias, Fisch. & Crosse.											
liebmanni, *Phil.*	cuneiformis, tumidus, umbonibus latis, marg. ventr. subsinuato.	rostrata, subangulata.	concentrice striatula.	trigoni, crassiusculi, crenati.	pallide purpurea.	$\frac{2}{7}$–$\frac{1}{3}$	93–102	44–50	41–45	33–40	Mexico.
acutirostris, *Lea*	cuneiformis, lateribus medio complanatis, antice abrupta, marg. ventr. sinuato.	deflexe et anguste rostrata.	,,	,,	flavescenti-alba.	$\frac{1}{5}$	71–78	35	30–33	25–27	Mexico.
goascoranensis, *Lea* ...	cuneiformis, antice rotundata, marg. ventr. subrecto.	subrostrata.	,,	subtrigoni, modici, crenulati.	albida vel livida.	$\frac{1}{3}$–$\frac{2}{7}$	58–65	32–33	27–31	20–23	W. Guatemala, W. Honduras.
tehuantepecensis, *Cr. & F.*	ovali-cuneata, tumida, antice crassa, subangulata, marg. ventr. subsinuato.	superne declivis, inferne oblique truncata.	,,	crassi, sulcato-lacerati.	albida.	$\frac{1}{3}$	68	38	32	25	S.W. Mexico.
——, var. copanensis, *v. Mart.*	ovali-cuneata, tumida, antice rotundata, marg. ventr. subsinuato.	,,	,,	,,	aurantia vel albida.	$\frac{1}{3}$	69	36	34	23	Honduras.
VI. Nephronaias, Fisch. & Crosse.											
aztecorum, *Phil.*	elongata, modice compressa, antice et postice subæqualiter rotundata, marg. ventr. subsinuato.	rotundata, supra magis declivis, infra leviter arcuata.	concentrice striatula (unicolor).	trigoni, modici vel parvi, sulcati.	purpurea, rarius cærulescenti-alba.	$\frac{2}{7}$–$\frac{2}{9}$	59–80	29–40	30–36	20–26	N.E. & E. Mexico.
——, var. strebeli, *Lea.*	subquadrata, marg. ventr. subrecto.	,,	,,	,,	purpurea vel salmonea.	$\frac{2}{7}$	73–94	42–49	39–50	24–33	E. Mexico.
——, var. soledadensis, *Cr. & F.*	elongata, marg. ventr. recto.	,,	concentrice striatula (viridi-radiata).	,,	purpurea.	$\frac{2}{7}$	67	33	33	20	E. Mexico.

——, var. chapalanus, *v. Mart.*	elliptico-elongata, modice compressa, utrinque rotundata, marg. ventr. subrecto.	,,	,,	,,	cærulescenti-alba.	$\frac{1}{4}$	60	$36\frac{1}{2}$	32	20	Centr. Mexico.
popei, *Lea*	rhomboideo-elongata, antice subproducta, humilior, marg. ventr. paulum sinuato.	subalata, dein rapide declivis.	concentrice striatula (vertice granulato).	subcompressi, breves, crenulati.	alba vel salmonea.	$\frac{2}{7}$	60	25	$27\frac{1}{2}$	15	N.E. Mexico.
poeyanus. *Lea*	elongata, lateribus complanatis, antice rotundata, subproducta, marg. ventr. sinuato.	superne arcuatim descendens, dein subtruncata.	concentrice striatula, periostraco subtilissime granuloso.	,,	flavescens.	$\frac{1}{4}$	55	$23\frac{1}{2}$	24	16	S.W. Mexico.
microdon, *v. Mart.* ...	elliptica, subcompressa, marg. dors. declivi, ventr. subrecto, antice valde ascendente.	arcuatim declivis, subrostrata.	concentrice striatula.	perparvi, subtrigoni.	alba.	$\frac{2}{5}$	107	57	48	34	N. Guatemala.
VII. Simonaias, Fisch. & Crosse.											
cuprinus, *Lea*	oblongus, compressus, vertice plano.	elongata.	concentrice leviter sulcata (rufo-fusca).	modici, trigoni, sulcati.	rosea vel roseo-alba, splendida.	.....	.....	...	...	...	.....
——, *a.* nephriticus, *F. & Cr.*	reniformis, marg. ventr. sinuato.	deflexa.	,,	,,	,,	$\frac{1}{4}$	53–60	22–29	$27\frac{1}{2}$–34	21	S.E. Mexico.
——, *b.* tabascoensis, *Charp.*	marg. dors. post. et ventr. rectis.	subrecta, truncata.	,,	,,	,,	$\frac{1}{4}$–$\frac{1}{5}$	52–64	24–34	26–33	?	
——, *c.* persulcatus, *Lea.*	marg. dors. post. et ventr. subrectis.	oblique truncata.	,,	,,	,,	$\frac{2}{7}$–$\frac{1}{4}$	50–51	21–26	26–27	15–17	
——, *d.* coloratus, *Charp.*	brevior, marg. ventr. subrecto.	,,	,,	,,	,,	$\frac{3}{10}$	49	28	28	18	
——, *e.* subventralis, *v. Mart.*	marg. ventr. modice arcuato.	,,	,,	,,	,,	$\frac{2}{5}$	55	29	29	18	
——, *f.* arcuans, *F. & Cr.*	marg. dors. arcuato, ventr. recto.	,,	,,	,,	,,	$\frac{1}{5}$	43–47	22–25	25–28	17	
dysoni, *Lea*	oblonga, compressa, antice subproducta, marg. dors. arcuato, ventr. subrecto.	rostrata, subangulata.	concentrice sulcata.	,,	albida.	$\frac{2}{7}$	48	25	27	$15\frac{1}{2}$	Honduras.
macnieli, *Lea*	breviter elliptica, marg. dors. convexo, ventr. subsinuato.	rotundata.	concentrice striata.	,,	,,	$\frac{1}{6}$	44	24	26	17	Nicaragua.

Comparative Table of the Species of *Unio* (*continued*).

Nomen.	Forma.	Pars postica.	Sculptura (Coloratio).	Dentes cardinales.	Facies interna.	Vertices in long.	Long.	Alt. vert.	Alt. alæ.	Diam.	Patria.
yzabalensis, *Cr. & F.* .	rhomboidea, subcompressa, ant. producte rotundata.	subtruncata, superne arcuata.	inæqualiter concentr. lirata, liris sæpius anastomosantibus.	subtrigoni, sat validi, sulcati.	pallide purpurea vel albida.	$\frac{2}{5}$–$\frac{1}{3}$	mm. 62	mm. 38	mm. 35	mm. $23\frac{1}{2}$	E. Guatemala, ? Honduras.
championi, *v. Mart.* ...	oblongo-elliptica, ant. late rotundata, marg. ventr. leviter arcuato.	declivi-rotundata.	concentr. dense et inæqualiter striata, pone umbones radiatim lirulata.	subcompressi, margini paralleli.	cærulescens.	$\frac{2}{5}$	30	17	16	$6\frac{1}{2}$	W. Guatemala.
hjalmarsoni, *Dunk.* ...	elliptico-elongata, modice compressa, ant. subproducta, marg. ventr. subrecto.	subtruncata.	concentr. dense sulcata, sulcis nonnullis anastomos. (flavo-virens).	subtrigoni, validi.	alba.	$\frac{1}{3}$	36	$18\frac{1}{2}$	17	11	Honduras.
nuculinus, *Phil.*	oblongo-elliptica, ant. producta, marg. ventr. sat arcuato.	æqualiter rostrata, unisulcata.	concentr. sulcata (pallide virens).	compressi, sublæves.	argenteo-alba.	$\frac{1}{3}$	$17\frac{1}{2}$	$9\frac{1}{2}$	9	6	Nicaragua.
VIII. Lampsilis, Raf.											
discus, *Lea*	elliptico-ovata, antice declivi-abrupta.	rostrata, perpendic. truncata.	concentr. ruditer striata, nitida, pallida.	trigoni, crassi, rugosi.	pallide violacea.	$\frac{1}{4}$	131	82	69?	40	N.E. Mexico.
——, var. connectens, *v. Mart.*	elliptica, compressa, ant. rotundata.	subrostrata, leviter truncata.	,,	,,	pallide aurantia.	$\frac{1}{3}$	130–134	78–81	71–85	38–41	N.E. Mexico.
——, var. panucoensis, *Phil.*	trigono-elliptica, compressa, ant. rotundata.	rotundata.	,,	,,	albida vel pallide purpurea.	$\frac{1}{3}$–$\frac{2}{7}$	114–126	79–80	69	37–41	N.E. Mexico.
tampicoensis, *Lea*	rotundato-elliptica, marg. ventr. medio recto, antice arcuato.	subrotundata.	concentr. leviter striata, nitida (viridi-fusca).	crassi, sat parvi, rugosi.	alba, dent. post. sæpe roseis.	$\frac{2}{7}$	97–112	62–65	59–66	35–42	N.E. & E. Mexico.
——, var. tecomatensis, *Lea.*	rotundato-elliptica, marg. ventr. toto arcuato; sat tumida.	rotundata.	,,	crassi, mediocres, rugosi.	purpurea vel salmonea.	$\frac{1}{3}$	89–98	55–64	58–61	40–41	E. Mexico.
——, var. umbrosus, *Lea.*	elliptico-oblonga, marg. ventr. medio recto, ant. et post. arcuato.	subangulato-rotundata.	,,	crassiusculi, sat parvi, rugosi.	pallide purpurea, granifera.	$\frac{1}{3}$–$\frac{2}{7}$	69–89	39–50	44–54	29–37	N.E. & E. Mexico.

berlandieri, *Lea*	subquadrato-ovata, inflata, marg. ventr. toto arcuato.	altior, oblique subtruncata.	„	subcompressi, sat magni, crenulati.	purpurascens vel salmonea.	$\frac{2}{7}$	88	63	57	43	N.E. Mexico.
alienigenus, *Cr. & F.*...	elliptica, posterius inflata.	altior, inflata, rotundata.	„	plus minusve compressi.	alba vel flavescens, subinde granifera.	$\frac{1}{3}$	59½–82	30½–51	34–48	24–30	E. Mexico.
sapotalensis, *Lea*	elliptica, vertice complanato, marg. dors. et ventr. parum arcuatis.	obtuse sub-biangulata.	lævis (viridi-multiradiata).	trigoni, modici.	subaurea, iridescens.	$\frac{1}{3}$	56	33	33	25	E. Mexico.
computatus, *Cr. & F.* .	ovali-elliptica, ant. ample arcuata, marg. dorsali subrecto, ventr. arcuato.	oblique subtruncata.	„	debiliores.	alba.	$\frac{1}{3}$	77	52	44	30	E. Mexico.
cognatus, *Lea*	ovata, subinflata, vertice prominente, marg. ventr. arcuato.	angulato-rostrata.	concentrice striata (viridi-radiata).	crassi, trigoni, rugoso-striati.	alba, iridescens.	$\frac{3}{7}$	45	28	24	18½	N.E. Mexico.
IX. Elliptio, Raf. tamaulipanus, *Conr.*...	"oblonga, subcompressa, marg. dors. et ventr. parallelis."	?	?	?	"candida."	?	?	?	?	?	N.E. Mexico.
rugoso-sulcatus, *Lea*	trigona, trapezoidea, ant. producta, marg. ventr. paulum arcuato.	carinata, triangulata.	rugoso-sulcata.	trigoni, crassi, sulcati.	albida.	$\frac{1}{3}$	79	57½	47	36	??
rubicundus, *v. Mart.*...	oblongo-trapezoidea, ant. producto-rotundata.	declivis, truncata.	grosse striata, plicalis obliquis pone umbones.	trigoni, sulcati, validi.	purpurea.	$\frac{1}{3}$	89	57	44	32	N. Guatemala.
pliciferus, *Lea*	elliptica, sat convexa, marg. ventr. subrecto.	rotundata.	plicis parvis radiantibus pone umbones.	trigoni, crassiusculi.	purpurea, raro alba.	$\frac{1}{3}$–$\frac{1}{2}$	42–56	23–35	24–32	17–26	E. Mexico.
——, var. minor, *F. & Cr.*	„	„	„	„	„	$\frac{1}{3}$	28–35	14–23	14	10–16	E. Mexico.
——, var. carbonarius, *Lea.*	elliptica, sat convexa, marg. ventr. subsinuato.	„	„	„	„	$\frac{1}{4}$	62	31	34	30	E. Mexico.
ravistellus, *Morel*.....	reniformis, ant. rotundata, marg. ventr. sinuato.	deflexa, subtruncata.	concentr. tenuistriata.	trigoni, parvi, sulcati.	plumbea.	$\frac{1}{3}$	35–40	17–22	18–19½	12–13½	E. Guatemala.
——, var. majusculus, *v. Mart.*	„	„	„	„	livido-alba.	$\frac{2}{7}$	55–59	26–27	27–28	17½–20	E. Guatemala.

COMPARATIVE TABLE OF THE SPECIES OF *UNIO* (*continued*).

Nomen.	Forma.	Pars postica.	Sculptura (Coloratio).	Dentes cardinales.	Facies interna.	Vertices in long.	Long.	Alt. vert.	Alt. alæ.	Diam.	Patria.
ravistellus, var. veræpacis, *Tristr.*	reniformis, ant. rotundata, marg. ventr. sinuato.	elongata, deflexa, breviter truncata.	concentr. tenuistriata.	trigoni, parvi, sulcati.	purpureo-fusca.	$\frac{1}{4}$	mm. 43–45	mm. 19–22	mm. 20–23	mm. $14\frac{1}{2}$	E. Guatemala.
opacatus, *Cr. & F.* ...	cuneiformis, ant. rotundata, marg. ventr. subrecto.	angulato-rostrata, marg. dors. postico arcuato.	concentrice striata.	crassi, rugosi, et lacerati.	albida, centro flavescens.	$\frac{1}{3}$	$53\frac{1}{2}$	36	28	?	Mexico.
mexicanus, *Phil.*	,,	angulato-rostrata, obtuse carinata.	,,	subtrigoni, sat validi.	purpurea.	$\frac{1}{3}$	64	36	34	24	Mexico.
sallei, *Cr. & F.*.....	cuneiformis, tumida, antice breviter rotundata, marg. ventr. medio subrecto.	subrostrata, obtusa.	concentrice valide striata (fusca).	validi, sulcati, et lacerati.	albida.	$\frac{1}{4}$	65	43	37	31	Mexico.
——, var. grossus, *v. Mart.*	subtriangularis, tumida, marg. ventr. antice valde ascendente, postice subsinuato.	deflexe rostrata.	,,	,,	,,	$\frac{1}{3}$	62	44	38	30	. Guatemala.
medellinus, *Lea*.....	obovato-elliptica, marg. ventr. in adultis subsinuato.	rotundata.	concentr. tenuistriata (viridiradiata).	breves, subcompressi.	iridescens, albida, centro flavido vel salmoneo.	$\frac{1}{3}$–$\frac{2}{7}$	46–57	23–26	24–32	15–21	E. Mexico.
æruginosus, *Morel.* ...	elliptica, sat compressa, antice abrupta, marg. ventr. subrecto.	rotundata, marg. dors. declivi.	concentr. tenuistriata.	parvi, trigoni.	cærulescenti-alba.	$\frac{1}{4}$	52	32	32	18	S.E. Mexico.
radiatulus, *v. Mart.* ...	elliptica, tumidiuscula, marg. ventr. subrecto.	rotundata, marg. dors. convexo.	concentr. tenuistriata (viridiradiata).	,,	pallide livida.	$\frac{2}{7}$	44	$24\frac{1}{2}$	$23\frac{1}{2}$	16	W. Guatemala.
rowelli, *Lea*	ovata, subcompressa, antice producta, marg. ventr. arcuato.	obtuse rostrata.	concentr. striatula.	compressi, crenulati.	alba, iridescens.	$\frac{1}{3}$	43	25	23	16	Centr. Nicaragua, N. Panama.
guatemalanus, *v. Mart.*	ovata, subcompressa, ant. subproducta, marg. ventr. modice arcuato.	subrostrata.	concentr. inæqualiter striata.	subcompressi, obliqui, crenati.	livida.	$\frac{1}{3}$–$\frac{3}{8}$	57	30–32	28–30	$17\frac{1}{2}$–19	W. Guatemala.
X. UNIOMERUS, Conrad.											
manubius, *A. Gould* .	cuneiformis, subventricosa, ant. angustata.	acuta, marg. dors. arcuato.	"rudis, epidermide nitide cornea."	compressi, margini fere paralleli.	argentata, "talcosa."	?	93	46	?	31	N. Centr. Mexico.

explicatus, *Morel.*	elliptica, ant. rotundata, marg. dors. et ventr. subrectis.	rotundata.	antice lævis, postice lamellosa.	compressi.	cærulescens.	⅓	108–116	58–66	58–66	38	S.E. Mexico.
XI. METAPTERA, Raf.											
paludosus, *Morel.*	compressa, subtrapezia, ala humili.	declivi - rostrata, lira oblique descendente.	lævis.	tenues, compressi.	albida.	⅓	57	31	34	15	Yucatan.
——, var. planivalvis, *Morel.*	,,	rostrata.	,,	,,	,,	⅔	66	35	36	14½	N. Guatemala.
scutulatus, *Morel.*	ovato-elliptica, compressa, vix alata.	declivi-rostrata.	postice plicis confertis, subverticalibus.	,,	,,	⅜	49	29	27	16	Yucatan.
——, var. obliteratus, *F. & Cr.*	,,	subrostrata.	plicis obliteratis.	,,	,,	⅓	47	25	27	13	Yucatan.
——, var. secabilis, *F. & Cr.*	,,	,,	plicis posticis validis, compressis.	,,	cupreo-salmonea.	⅓	49	26½	28½	14	Yucatan.
delphinulus, *Morel.* ...	oblonga, antice angulata, ala conspicua, erecta, antrorsum vergente, symphynota.	obtuse rostrata.	concentr. striatula.	compressi, parvi.	albida, iridescens.	¼	60–69	26–30	50	11–12	N. Guatemala.

In the measurements given in the above comparative table and in the descriptions, "long." means the extension of the shell in the direction of the mouth to the vent of the animal, more or less parallel to the dorsal (ligamental) and to the ventral (basal) margin of the shell; it is the "diam. antéro-postérieur" of Fischer and Crosse, the largest dimension in almost all species of this genus. "Alt. vert.," the height of the summits, is the dimension at a right angle to the length, from the summits to the ventral margin; it is the "diam. umbono-ventral" of Fischer and Crosse. "Alt. alæ," the height of the wing, is a parallel dimension, from the uppermost end of the wing, or, where no distinct wing is present, from the hinder end of the ligament where it forms a small sinus in the calcareous matter of the dorsal margin, also at a right angle to the ventral margin; in winged species this dimension is greater than the preceding (alt. vert.), in those without wing with parallel dorsal and ventral margins it is nearly equal, in species with descending hinder dorsal margins it is less than the height of the summits. Few authors give this measurement, but it is desirable to record it, as affording a clue to the shape of the hinder dorsal margin, if compared with the height of the summits: in the species not represented in the collections before me, I have taken the measurement from the published figures. "Diameter" is the dimension from the most convex part of the right valve to the corresponding point of the left valve, across the animal. "Fore part (ant.)" is the portion of the shell before the summits; it is in all species of the genus shorter than the hinder part, the extension behind the summits. In referring to the descriptions of the older authors, as Linnæus, Lamarck, and Say, it must be borne in mind that these authors call the real fore part the hinder one, and *vice versâ*, without regard to the structure of the living animal; it was Nilsson, in 1822, who first introduced the correct application of the terms before and behind, above and below, in the description of the Bivalves.

Geographical Distribution of the Mexican and Central-American Species of *Unio*.

Atlantic Slope.

	N.E. Mexico.	E. Mexico.	N. Guatemala and S.E. Mexico.	Yucatan.	E. Guatemala.	Honduras.	Central and E. Nicaragua.	E. Costa Rica.	N. Panama.
I. Crenodonta	*nicklinianus*, ? *digitatus*.	.....	*digitatus*, *stolli*.						
II. Psoronaias	*semigranosus*.	*semigranosus* var. *distinctus*, *psoricus* var. *pigerrimus*.	*semigranosus*, with var. *testudineus*, *psoricus*, *corium*, *morini*, *crocodilorum*, *ostreatus*, *percompressus*.						
III. Arotonaias	.....	.....	.....	.....	.....	.....	*cyrenoides*, *newcombianus*, *gabbianus*, *encarpus*, *imbricatus*, *granadensis*, *aratus*.		
IV. Pleurobema....	*couchianus*.	.....	*spheniopsis*, *usumacintæ*.						
V. Sphenonaias ..	.....	? *liebmanni*, ? *acutirostris*.	.....	.....	.....	*tehuantepecensis* var. *copanensis*.			
VI. Nephronaias ..	*aztecorum*, *popei*.	*aztecorum* with var. *soledadensis*, *strebeli*.	*microdon*.						
VII. Simonaias	.....	.....	*cuprinus* with varr.	.....	*yzabalensis*.	*dysoni*, *hjalmarsoni*.	*macnieli*, *nuculinus*.		
VIII. Lampsilis	*discus* with varr., *tampicoensis* with var. *umbrosus*, *berlandieri*, *cognatus*.	*tampicoensis* with var., *alienigenus*, *sapotalensis*, *computatus*.							

IX. Elliptio	*tamaulipanus, mitchelli.*	*pliciferus* with varr., ? *opacatus*, ? *mexicanus*, ? *sallei*, *medellinus.*	*rubicundus, sallei* var. *grossus, æruginosus.*	.....	*ravistellus* with varr.	.....	*rowelli.*	.....	*rowelli.*
X. Uniomerus	*manubius.*	.....	*explicatus.*						
XI. Metaptera ...	.....	.....	*paludosus* with var., *delphinulus.*	*largillierti, scutulatus* with varr.					

Pacific Slope.

	N W. Mexico.	W. Mexico.	S.W. Mexico.	W. Guatemala.	Salvador.	W. Honduras.	W. Nicaragua.	W. Costa Rica.	S. Panama.
I. Crenodonta.									
II. Psoronaias.									
III. Arotonaias	.....	.....	.....	.....	.....	.....	.....	.....	*caldwelli.*
IV. Pleurobema.									
V. Sphenonaias ..	.....	.....	? *liebmanni, tehuantepecensis.*	*goascoranensis.*	.....	*goascoranensis.*			
VI. Nephronaias ..	.....	*aztecorum* var. *chapalanus.*	*poeyanus.*						
VII. Simonaias	.....	.....	.....	*championi.*					
VIII. Lampsilis.									
IX. Elliptio	.....	.....	? *mexicanus.*	*radiatulus, guatemalanus.*					
X. Uniomerus.									
XI. Metaptera.									

I. Crenodonta, Schlüter.

1. **Unio digitatus.**

Unio digitatus, Morelet, Test. Noviss. ii. p. 24 (1851) [1]; Fisch. & Crosse, Miss. Scient. Mex., Moll. ii. p. 563, t. 60. fig. 1 [2].

Unio eightsii, Lea, Proc. Acad. Phil. 1860, p. 306 [3]; Journ. Acad. Phil. (2) iv. p. 367, t. 64. fig. 192 [4]; Obs. Gen. *Unio*, viii. p. 49, t. 14. fig. 192 [5].

Near the following (*U. stolli*), but distinguished by a more four-sided, not circular outline, the posterior dorsal margin and the middle part of the ventral margin being nearly horizontal, and the radiating plaits increasing in size from above to below, the uppermost small, numerous, somewhat recurved forwards, the two undermost very broad and strong, running obliquely towards below and behind.

a. Long. 130; alt. vert. 81, alæ 86, diam. 46 millim. Vertices in $\frac{1}{4}$ long.
b. „ 114; „ 75, „ 82, „ 47 „ „ $\frac{1}{4}$ „

a. Dimensions taken from Fischer and Crosse's figure; *b*, from Lea's figure.

Hab. ? N.E. Mexico: Rio Sabinas, Nuevo Leon (*Eights* [3–5]).
N. Guatemala: Rio Usumacinta, at deep spots (*Morelet* [1 2]).

The descriptions and figures of Fischer and Crosse [2] and Lea [3 4 5] evidently refer to one and the same species. But as regards the localities, it is scarcely credible that such a characteristic and large-sized *Unio* should live in two rivers so very far distant one from the other, and not have been found in the intermediate ones, as, for instance, in the Panuco or the Medellin. As to the locality given by Morelet [1], there is no reason to doubt it, as he was himself in that country; but that given by Lea [3 4 5], "Rio Sabinas," may be a mistake for Rio de las Salinas, the name of the upper course of the Usumacinta. There is, however, in N.E. Mexico, a town of Sabinas as well as a Rio Sabinas, on the confines of the States of Coahuila and Nuevo Leon, this river being a confluent of the Rio Salado, which discharges itself into the Rio Grande del Norte; there is also a Rio Salinas in the State of Nuevo Leon, a confluent of the Rio San Juan. I must therefore leave this difficulty for future elucidation.

2. **Unio stolli,** n. n. (Tab. XXIX. fig. 2.)

Unio nicklianus, Küster, in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, *Unio*, p. 218, t. 73. fig. 3 [1] (nec Lea); v. Mart. Sitzungsb. Ges. nat. Freunde Berlin, 1887, p. 107 [2].

Testa subtrapezia, compressa, antice brevissime abrupta, postice alata, plicis crassis inæqualibus a vertice retrorsum radiantibus sæpius furcatis sculpta, superioribus in alam extensis, paululum antrorsum incurvatis, posterioribus magis validis, subhorizontalibus, inferioribus modicis, subverticalibus; vertices compressi, margo dorsalis posterior primum in alam mediocrem ascendens, dein oblique stricte descendens; extremitas postica subrotundata, margo ventralis vix arcuatus, antice magis ascendens. Dentes cardinales validi, triangulares, sulcati. Facies interna alba, margaritacea.

a. Long. 128; alt. vert. 62, alæ 93, diam. 34 millim. Vertices in $\frac{1}{6}$ long.
b. „ 160; „ 78, „ 128, „ ? „ „ $\frac{1}{8}$ „

a. Stoll's specimen, type; *b*. Küster's figure.

Hab. N. Guatemala: Rio de las Salinas (*Stoll* [2]).

This species is intermediate between *U. digitatus* and *U. nicklinianus*: the plaits

are more expressed and distinct than in the latter, more unequal and more numerous than in the former; the general shape is not so rounded as in *U. nicklinianus* and more compressed than in *U. digitatus*; the posterior margin of the wings descends more obliquely, less abruptly than in either of these species. Küster [1] gives "Mexico" as locality, probably because he identified it with the following species; his spelling "*nicklianus*" is a mistake for "*nicklinianus*," as may be seen from the works cited.

Unio boykinianus, Lea, Obs. Gen. *Unio*, iii. p. 46, t. 9. fig. 22, from Chattahoochee river, Georgia, is very like this species in sculpture, but it is much smaller and more swollen.

3. **Unio nicklinianus.**

Unio nicklinianus, Lea, Trans. Am. Phil. Soc. v. p. 28, t. 1 (1832)[1]; Obs. Gen. *Unio*, i. p. 140, t. 1[2], and iii. p. 72, nota[3]; Hanley, Cat. Rec. Bivalv. p. 175, t. 21. fig. 52[4]; Sowerby, in Reeve's Conch. Icon. xvi., *Unio*, t. 53. fig. 276[5]; Fisch. & Crosse, Miss. Scient. Mex., Moll. ii. p. 565[6].

Nearly circular, the posterior dorsal margin much ascending, posteriorly rapidly descending, the ventral margin strongly rounded; the plaits broad, but flat, not very unequal, none on the ventral margin.

a. Long. 148; alt. vert. 74, alæ 121, diam. 52 millim. Vertices in $\frac{1}{7}$ long.
b. „ 144; „ 85, „ 115, „ ? „ „ $\frac{1}{7}$ „
a, from Lea's; *b*, from Sowerby's figure.

Hab. N.E. Mexico: Rio Moctezuma, an affluent of the southern Rio Panuco (*Dr. Blanding*[3]).

II. Psoronaias, Fisch. & Crosse.

4. **Unio semigranosus.** (Tab. XXX. figg. 1–4.)

Unio semigranosus, Von dem Busch, in Philippi's Abbild. neuer Conch. i. p. 19, t. 1. (*Unio*) figg. 1–3 (1842)[1]; Hanley, Cat. Rec. Bivalv. p. 381, t. 20. fig. 33[2]; Küster, in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, *Unio*, p. 252, t. 81. fig. 1[3]; Fisch. & Crosse, Miss. Scient. Mex., Moll. ii. p. 569[4]; Pilsbry, Proc. Acad. Phil. 1892, p. 339[5].

Upper half of shell distinctly granulated. General outline oval-oblong; ventral margin feebly convex; height about $\frac{2}{3}$–$\frac{3}{5}$ of the length of the shell; transverse diameter, height about $\frac{2}{5}$ of the length.

Hab. N.E. Mexico: Rio Panuco, at Tampico (*V. d. Busch*[1–4]).
S.E. Mexico: Rio Tulija in Tabasco (*Rovirosa*[5]).

Figg. 3 and 4 represent full-grown specimens from the late Prof. Dunker's collection; fig. 3 an example from Tampico.

Var. *testudineus*.

Unio testudineus, Morelet, Test. Noviss. i. p. 28 (1849)[6]; Fisch. & Crosse, Miss. Scient. Mex., Moll. ii. p. 571, t. 62. fig. 3, t. 70. fig. 3[7] (nec Sowerby).

Unio semigranosus, Sowerby, in Reeve's Conch. Icon. xvi., *Unio*, t. 10. fig. 36[8].

Sculpture as in *U. semigranosus*, but extending over nearly the whole surface; general outline more rounded; ventral margin very convex; height about $\frac{3}{4}$, diameter about $\frac{3}{8}$ of the length.

Hab. N.W. Guatemala: Rio Usumacinta (*Morelet*[6 7]).

Notwithstanding the differences in form and locality, Morelet's species appears to me to be nothing more than a young form of *U. semigranosus*. I have before me three specimens of the latter, two of them old and thick (figg. 3, 3 *a*, *b*, from Tampico, and figg. 4, 4 *a*, *b*), with strong cardinal teeth, the granulation occupying only about half the surface, and the ventral margin being feebly convex; but the lines of growth show that when these examples were young the ventral margin was much more convex and the whole shell covered with granulations. Another specimen, from Tampico, given by A. Gruner to Prof. Dunker (figg. 2, 2 *a*, *b*), is somewhat more compressed, with the outside of a brighter brown colour, the inside paler, salmon-coloured, with more feeble teeth; these peculiarities indicate that it is a younger shell, although it has the same length as the smaller one of the normal examples. Moreover, in this young specimen the ventral margin is more convex and the granulation extends nearer to the ventral margin; it differs only from Fischer and Crosse's figure of *U. testudineus* in having the summits somewhat more advanced, in $\frac{3}{8}$ of the whole length, instead of $\frac{4}{9}$ as in *U. testudineus*. A very young specimen is also figured (figg. 1, 1 *a*).

Var. *distinctus*.

Unio distinctus, Crosse & Fisch. Journ. de Conch. xli. p. 110 (1893) [9]; Miss. Scient. Mex., Moll. ii. p. 580, t. 69. figg. 2, 2 *a*, *b* [10].

Hab. E. Mexico: Rio Cosamaloapam (confluent of the Rio Alvarado), near Chacaltianguis, State of Vera Cruz (*Sallé* [9 10]).

The figure given by Crosse and Fischer [10] is very like that of *U. semigranosus*, only it represents a comparatively lower shell.

5. **Unio psoricus.** (Tab. XXXI. figg. 1, 1 *a*, 2.)

Unio psoricus, Morelet, Test. Noviss. i. p. 25 (1849) [1]; Fisch. & Crosse, Miss. Scient. Mex., Moll. ii. p. 572, t. 61. fig. 3 [2].

Shell granulated in its upper part, as in *U. semigranosus*, but more swollen and with the hinder part bent downward; the ventral margin at first moderately convex, then sinuated, and finally projecting, corresponding to an obtuse ridge descending from the summits.

Hab. N. Guatemala: Rio Usumacinta (*Morelet* [1 2]); Rio de las Salinas (*Stoll*).

The general outlines vary to a certain extent, being either somewhat triangular-rhomboid or oblong, the length of the shell ranging from $1\frac{1}{4}$ (fig. 1) to $1\frac{1}{2}$ (fig. 2) of the height in specimens from the same locality. The inside is either purple or whitish.

Var. *pigerrimus*.

Unio pigerrimus, Crosse & Fisch. Journ. de Conch. xli. p. 293 (1893) [3]; Miss. Scient. Mex., Moll. ii. p. 582, t. 65. figg. 1, 1 *a* [4].

Hab. Mexico (*Sallé* [3 4]).

Rounded, elliptical, the granulosities comparatively large and arranged in arcuated lines, as in a specimen of *U. corium* in the Berlin Museum.

6. **Unio corium.** (Tab. XXXI. figg. 4, 4 *a*, *b*.)

Unio corium, Sowerby, in Reeve's Conch. Icon. xvi., *Unio*, t. 10. fig. 39 (1864) [1]; Fisch. & Crosse, Miss. Scient. Mex., Moll. ii. p. 570 [2].

Also near *U. semigranosus*, but more elongated, the summits in $\frac{2}{7}$ of the whole length; the granulosities near the summits arranged in arcuated lines.

Long. 103; alt. vert. 63, alæ 59, diam. $38\frac{1}{2}$ millim.

Hab. S.E. Mexico: Chiapas [1].

The type figured by Sowerby has a small distinct sinus at the hinder end of the ventral margin; but a specimen in the Berlin Museum from the late Paetel's collection, here figured (figg. 4, 4 *a*, *b*), somewhat larger and otherwise agreeing, has scarcely an indication of it.

7. **Unio morini.**

Unio morini, Morelet, Test. Noviss. ii. p. 25 (1851) [1]; Fisch. & Crosse, Miss. Scient. Mex., Moll. ii. p. 576, t. 60. fig. 2, t. 67. fig. 4 [2].

Near *U. corium*, but with the summits still more advanced, in $\frac{1}{4}$–$\frac{1}{5}$ of the length; the granulosities smaller and more crowded, the fore part inflated, the hinder part more compressed, with two feeble ridges running from the summits behind and below; ventral margin straight, a little sinuated behind.

Hab. N. Guatemala: Rio Usumacinta (*Morelet* [1 2]).

In the typical specimen, figured by Fischer and Crosse [2], the inside is bluish-white and the two posterior ridges, although feeble, cause a distinct notch at the hinder extremity.

8. **Unio crocodilorum.** (Tab. XXXI. figg. 3, 3 *a*, *b*, *c*.)

Unio crocodilorum, Morelet, Test. Noviss. i. p. 28 (1849) [1]; Fisch. & Crosse, Miss. Scient. Mex., Moll. ii. p. 577, t. 60. figg. 3–5, t. 67. fig. 3 [2].

Unio pliciferus, Sowerby, in Reeve's Conch. Icon. xvi., *Unio*, t. 10. fig. 37 [3].

Cuneiform, swollen, and minutely tuberculated, rounded before, produced and beaked behind.

Hab. N. Guatemala: Rio Usumacinta, Province of Peten (*Morelet* [1 2]); Coban (*Mus. Berol.*).

Fischer and Crosse [2] distinguish two varieties, β. *semipustulatus* (fig. 4), with tubercles in the middle part of the shell only, and γ. *præstrictus* (fig. 5), shorter and more swollen, both from the same locality. Inside purple, seldom white in the typical form: white in the var. *semipustulatus*, purple in the var. *præstrictus*; the colour therefore affords no reliable difference.

The specimen from Coban belongs to the var. *præstrictus*.

The specimen figured here (figg. 3, 3 *a*–*c*), from Paetel's collection, with the simple indication "Mexico," looks at first sight rather like *U. morini*, but on a closer examination of the essential characters I find that it agrees better with *U. crocodilorum*, viz. in the declivity of the dorsal margin beginning behind the summits, in the more produced

and rounded shape of the fore part, and in the strong convexity of the valves; inside it is of a dull rose-colour, like Fischer and Crosse's fig. 5 (tab. 60). This shell exhibits a curious abnormality in the hinge-line, this apparently having been broken by accident and cemented by brownish crumbling matter (see fig. 3 *c*).

9. **Unio ostreatus.**

Unio ostreatus, Morelet, Test. Noviss. i. p. 29 (1849)[1]; Fisch. & Crosse, Miss. Scient. Mex., Moll. ii. p. 573, t. 63. fig. 3, t. 70. fig. 4[2].

Hab. N. Guatemala: Rio Usumacinta (*Morelet* [1 2]).

The name *ostreatus* suggests that the somewhat worn shell resembles an oyster. One specimen only known.

10. **Unio percompressus.** (Tab. XXXII. figg. 1–3.)

Unio percompressus, v. Mart. Sitzungsb. Ges. nat. Freunde Berlin, 1887, p. 107[1].

Shell very compressed, the diameter equalling only about $\frac{1}{3}$ of the length or height; outline trigonal or cordate, with very flat sides; fore part very short, descending above obliquely and somewhat concavely, rounded in the lower half; hinder part descending in a more or less convex line in the upper third, almost perpendicular in the lower third of its height; ventral margin feebly rounded, with a small sinus, followed by a blunt projection at its hinder end. There are, however, remarkable variations in the external outline, the upper hinder margin descending in some specimens almost perpendicularly, which gives a triangular form to the shell, and the small sinus of the ventral margin is sometimes wanting. Sculpture with coarse concentric wrinkles, which are somewhat granulated in the upper half of the shell, but usually much worn. The inside in some specimens dull purple, in others with scattered dull orange spots, as if stained by oil, in others again pure white. Anterior tooth strong, but not very broad, descending almost perpendicularly and as far downwards as the posterior (lateral) tooth.

a.	Long. 98;	alt. vert.	76,	alæ	66,	diam.	28	millim.	Vertices in $\frac{2}{7}$	long.	(Figg. 3, 3 *a*, *b*.)
b.	„ 94;	„	92,	„	64,	„	$28\frac{1}{2}$	„	„	$\frac{1}{3}$ „	(Figg. 1, 1 *a*.)
c.	„ 95;	„	73,	„	67,	„	24	„	„	$\frac{2}{7}$ „	
d.	„ 73;	„	68,	„	60,	„	22	„	„	$\frac{2}{7}$ „	(Figg. 2, 2 *a*.)

Hab. N. Guatemala: Rio de las Salinas (*Stoll* [1]).

Rather near *U. ostreatus*, Morel., with which, perhaps, when a greater number of specimens of different ages are known, it may have to be united, Morelet's unique example representing a younger form. The four specimens of *U. percompressus* before me differ very remarkably one from the other, as will be seen by the figures and the measurements; but they agree *inter se*, and differ from Morelet's *U. ostreatus*, in the following points:—(1) The shell is more compressed, the diameter being about a third of the length (in *U. ostreatus* nearly $\frac{1}{2}$); (2) the anterior tooth is directed almost perpendicularly downward (in *U. ostreatus* much more obliquely). Moreover, three of the specimens have the posterior dorsal margin much more convex, which gives the shell a somewhat cordiform, *Venus*-like outline; whereas one only (*b*, figg. 1, 1 *a*) has the posterior margin nearly straight and the outline, in consequence, triangular, as in *U. ostreatus*. The smallest example (*d*, figg. 2, 2 *a*), probably not quite full-grown, the outside not being worn, comes near Morelet's shell in size and in the comparative

feebleness of the anterior tooth, but certainly differs from it in the convexity of the posterior margin, which is relatively as much compressed as in the larger ones; it shows, however, a feeble indication of the elevated ridge running from the summits towards behind and below, which is more developed in *U. ostreatus*.

The three older specimens are not only worn and excoriated in places, but they are also beset with calcareous incrustations in others, as will be seen by our figure 1.

III. Arotonaias, v. Mart.

11. **Unio cyrenoides.**

Unio cyrenoides, Philippi, Zeitschr. f. Malak. iv. p. 93 (1847)[1]; Abbild. neuer Conch. p. 79, *Unio*, t. 5. fig. 1[2]; Küster, in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, *Unio*, p. 285, t. 96. fig. 1 (copy)[3].

Triangular, rather convex, with concentric, somewhat granulated ridges, some of which are irregularly furcated or anastomosing; summits in $\frac{1}{3}$ of the length; ventral margin much arcuated.

a. Long. 44; alt. vert. 34, alæ 28, diam. 32 millim.
b. „ 49; „ 37, „ 31, „ 26 „
c. „ 36; „ 29, „ 24, „ 19 „

a. Philippi's figure; *b* and *c*. Specimens in the Berlin Museum, from the Lake of Managua.

Hab. Central Nicaragua: Lake of Nicaragua (*Largilliert* [1–3]); Lake of Managua (*Stoll*).

In Philippi's type the inside is pale red, in the specimens from the Lake of Managua it is white. Two of the four examples given by O. Stoll to the Berlin Museum are somewhat unequivalve, the left valve being more swollen behind the summits than the right, which causes an asymmetry in the posterior area. A similar asymmetry is indicated by Lea in *U. newcombianus* and *U. gabbianus*.

It is possible that these two last-mentioned species, and some others described as peculiar to the said lakes, may prove to be individual variations or local forms of *U. cyrenoides*; but as I have only one specimen of *U. newcombianus* and none of *U. gabbianus* before me, I am obliged to admit them provisionally as distinct.

Lake Managua is a little north of the much greater Lake of Nicaragua, and discharges its waters into it.

12. **Unio newcombianus.** (Tab. XXIX. figg. 1, 1 *a*. *b*.)

Unio newcombianus, Lea, Proc. Acad. Phil. viii. p. 103 (1857)[1]; Journ. Acad. Phil. (2) iii. p. 314, t. 10. fig. 27[2]; Obs. Gen. *Unio*, vi. p. 32, t. 10. fig. 27[3].

Unio sagrinatus, Sowerby, in Reeve's Conch. Icon. xvi., *Unio*, t. 67. fig. 345[4].

More elevated than *U. cyrenoides*; ventral margin strongly arcuated, almost in the shape of a bag; the concentric ridges roughly wrinkled; inside white.

a. Long. 34; alt. vert. 28, alæ 22, diam. 16 millim.
b. „ 44; „ $36\frac{1}{2}$, „ 34, „ ? „
c. „ 36; „ 32, „ 28, „ 16 „

a. Lea's figure; *b*. Sowerby's figure; *c*. Specimen collected by Stoll.

Hab. Nicaragua: without nearer indication of locality (*Newcomb* [1–3]); Lake of Managua (*Stoll*).

The name "*sagrinatus*" is latinized from the modern word "shagreened," in Italian "sagrinato." I give a figure of a specimen from Managua, in order to show the slight degree of inequality between the two valves in this and some allied species.

13. **Unio gabbianus.** (Tab. XXXIX. figg. 5, 5 *a*, *b*.)

Unio gabbianus, Lea, Proc. Acad. Phil. 1868, p. 95 [1]; Journ. Acad. Phil. (2) vi. p. 295, t. 43. fig. 106 [2]; Obs. Gen. *Unio*, xii. p. 55, t. 43. fig. 106 [3]; Tate, Am. Journ. of Conch. v. p. 160 (1870) [4].

Unio nicaraguensis, Lea, Proc. Acad. Phil. 1868, p. 95 [5]; Journ. Acad. Phil. (2) vi. p. 296, t. 43. fig. 107 [6]; Obs. Gen. *Unio*, xii. p. 56, t. 43. fig. 167 [7].

Somewhat more oblong than *U. cyrenoides*, comparatively lower, the concentric ridges not granulated, the anterior teeth more feeble; inside silvery-white.

a. Long. 39; alt. vert. 26½, alæ 27½, diam. 18½ millim.
b. „ 34; „ 25, „ 22, „ ? „

a. Lea's measurements of *U. gabbianus*; *b*, of *U. nicaraguensis*.

Hab. CENTRAL NICARAGUA: Lake of Nicaragua (*Bridges* [1–3 5–7]); north shore of Lake Nicaragua (*Tate* [4]).

I cannot find any reliable difference between *U. gabbianus* and *U. nicaraguensis*, Lea.

14. **Unio imbricatus.** (Tab. XLIII. figg. 6, 6 *a–c*.)

Unio (*Plagiola*) *imbricatus*, Mörch, Malak. Blätt. vii. p. 205 (1860–61) [1].

Unio encarpus, Lea, Proc. Acad. Phil. 1868, p. 95 [2]; Journ. Acad. Phil. (2) vi. p. 294, t. 42. fig. 105 [3]; Obs. Gen. *Unio*, xii. p. 54, t. 42. fig. 105 [4].

Hab. E. (?) NICARAGUA: probably from San Juan (*Ærsted* [1]).
CENTRAL NICARAGUA: Lake of Nicaragua (*Bridges* [2–4]).

Since the Table of the species of *Unio* was printed, Dr. R. Bergh, of Copenhagen, has been kind enough to obtain for me the typical specimen of *U. imbricatus*, Mörch, for examination, and I find that it agrees in all its essential characters with *U. encarpus*, Lea. The concentric ridges are minutely waved, especially in the fore part, and this is what Lea meant by his expression "festoon-like striæ," and from which he took the specific name "*encarpus*." On the hinder half of the shell in the typical specimen there are some impressed lines radiating from the summits to the ventral margin, and crossing the concentric ridges at a right angle (see our fig. 6 *c*); these are not mentioned in Lea's description, but some of them are visible in his figure. We now take the opportunity of figuring Mörch's type.

15. **Unio caldwelli.**

Unio caldwelli, Lea, Proc. Acad. Phil. 1858, p. 118 [1]; Journ. Acad. Phil. (2) iv. p. 265, t. 43. fig. 145 [2]; Obs. Gen. *Unio*, vii. p. 83, t. 43. fig. 145 [3]; Sowerby, in Reeve's Conch. Icon. xvi., *Unio*, t. 89. fig. 477 [4].

Unio averyi, Lea, Proc. Acad. Phil. 1859, p. 281 [5]; Journ. Acad. Phil. (2) iv. p. 269, t. 44. fig. 149 [6]; Obs. Gen. *Unio*, vii. p. 87, t. 44. fig. 149 [7].

Oval-trigonal, swollen, solid, concentrically furrowed; furrows in the hinder part less impressed; summits not very prominent, with minute undulated sculpture, if not eroded; inside white or salmon-coloured; cardinal teeth strong, triangular.

a. Long. 41; alt. vert. 28½, alæ 26½, diam. 17 millim. Vertices in ⅓ long.
b. „ 60; „ 40, „ 35, „ 31 „ „ „ ⅓ „

Hab. S. Panama: Isthmus of Darien (*Dr. Caldwell, U.S.N.* [1–3]); Rio Chumnagua (? Chugunagua), on the same Isthmus (*Avery* [5–7]).

I have no doubt that the two forms distinguished by Lea represent different stages of growth of one species, *averyi* (dimens. *b*), being founded on a very old specimen. In this genus old examples are often comparatively more swollen than young ones.

This is the species of "clam" upon which "the ill-fated expedition under Lieut. Strain partly subsisted during their journey across the Isthmus."

16. **Unio granadensis.**

Unio granadensis, Lea, Proc. Acad. Phil. 1868, p. 95 [1]; Journ. Acad. Phil. (2) vi. p. 293, t. 42. fig. 103 [2]; Obs. Gen. *Unio*, vii. p. 53, t. 42. fig. 103 [3].

Hab. Central Nicaragua: Lake of Nicaragua (*Bridges* [1–3]).

The name of this species, as well as that of *Anodonta granadensis*, Lea, has been taken from the town of Granada, on the north-western shore of the Lake of Nicaragua.

17. **Unio aratus.** (Tab. XXXIX. figg. 1, 1 *a*, *b*, 2, 3, 3 *a*, *b*.)

Unio aratus, Lea, Obs. Gen. *Unio*, iv. p. 40, t. 42. fig. 12 [1], vi. p. 33 [2].

Unio globulosus, in coll. Dunker [3].

Of small size, triangularly elliptical, with equal regular concentric ridges; fore part short, rounded; hinder part elongated, with two ridges enclosing a narrow furrow, descending from the summits to the hinder extremity; ventral margin nearly straight.

a. Long. 25; alt. vert. 16, alæ 13, diam. 13 millim. Vertices in ⅓ long.
b. „ 18; „ 11½, „ 10, „ 8 „ „ „ ⅓ „
a. Dunker's specimen; *b*. Lea's specimen.

Hab. Central Nicaragua: Lake of Nicaragua (*Lea* [1 2]).
Central America: without nearer indication of locality (*Largilliert* [3]).

Dunker's specimen (here figured) agrees so nearly with Lea's description and figure that I think it is a more fully grown or individually larger example of the same species. The diameter only being comparatively larger, the shell may be termed inflate, while Lea describes it as "rather compressed"; but this difference is often to be seen between very old and normal specimens of one species. Lea says:—"Cardinal teeth disposed to be double in both valves"; in Dunker's specimen there are distinctly two cardinal teeth, one before and the other behind, in the left valve; and also two, the one above and the other beneath, the latter stronger, but separated by a deep horizontal cleft, in the right valve.

IV. Pleurobema, Raf.

18. **Unio spheniopsis.**

Unio spheniopsis, Morelet, Test. Noviss. i. p. 29 (1849) [1]; Fisch. & Crosse, Miss. Scient. Mex., Moll. ii. p. 583, t. 61. figg. 2, 2 *a*, *b* [2].

Trigonal, swollen, with a conspicuous ridge descending from the summits towards the hinder extremity, separating a distinct posterior area from the rest of the surface.

Hab. N. Guatemala: upper region of the Rio Usumacinta, Province of Peten (*Morelet* [1 2]).

19. **Unio couchianus.**

Unio couchianus, Lea, Proc. Acad. Phil. 1860, p. 305 [1]; Journ. Acad. Phil. (2) iv. p. 371, t. 66. fig. 196 [2]; Obs. Gen. *Unio*, viii. p. 53, t. 16. fig. 196 [3].

Near the preceding, but more quadrangular; the ridge broader and somewhat more advanced, limited on each side by depressions; some small plaits on the posterior area.

Hab. N.E. Mexico: Rio Salado, in Nuevo Leon (*Berlandier* [1–3]).

Small, short, oblique plaits on the posterior area are distinctly represented in the figure, but not mentioned in the description.

20. **Unio usumacintæ.**

Unio usumasintæ, Crosse & Fisch. Journ. de Conch. xl. p. 194 (1892) [1]; Miss. Scient. Mex., Moll. ii. p. 574, t. 63. fig. 4, t. 67. fig. 5 [2].

Triangular, very swollen, with prominent summits and a descending keel behind them; sculpture irregular, consisting of plaits and tubercles.

Hab. N. Guatemala: Rio Usumacinta (*Morelet* [1 2]).

This species is intermediate between *Psoronaias* and *Pleurobema*, exhibiting the general form of the latter and the sculpture of the former. In the sculpture and triangular form it approaches also the group of *U. gabbianus* (*Arotonaias*), but differs from them, as well as from *Psoronaias*, in the very swollen summits.

V. Sphenonaias, Fisch. & Crosse.

21. **Unio liebmanni.** (Tab. XXXIV. figg. 1, 1 *a*, *b*.)

Unio liebmanni, Philippi, Zeitschr. f. Malak. iv. p. 96 (1847) [1]; Abbild. neuer Conch. iii. p. 37, t. 6. fig. 1 [2]; Küster, in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, *Unio*, p. 281, t. 94. fig. 7 [3]; Fisch. & Crosse, Miss. Scient. Mex., Moll. ii. p. 616 [4].

Solid, heavy, convex, rounded and somewhat produced before, distinctly beaked behind; ventral margin a little sinuated; summits broad, not prominent; inside pale purplish.

a. Long. 102; alt. vert. 50, alæ 44, diam. 36 millim. Vertices in $\frac{2}{7}$ long.
b. „ 101; „ 50, „ 45, „ 40 „ „ $\frac{1}{3}$ „
c. „ 93; „ $44\frac{1}{2}$, „ 41, „ 33 „ „ $\frac{2}{7}$ „

a. Figure given by Küster; *b*. Philippi's original figure; *c*. Specimen given by the Copenhagen Museum to that of Berlin.

Hab. Mexico, without nearer indication of locality (*Liebmann* * [1]).

* Prof. F. Liebmann, of Copenhagen, travelled in Mexico, in 1840–1843, not only on the eastern slope (Vera Cruz, Papantla, &c.), but on the western also (Acapulco, &c.).

22. **Unio acutirostris.**

Unio acutirostris, Lea, Proc. Acad. Phil. 1866, p. 34[1]; Journ. Acad. Phil. (2) vi. p. 270, t. 35. fig. 84[2]; Obs. Gen. *Unio*, xii. p. 30, t. 35. fig. 84[3].

Unio sphenorhynchus, Crosse & Fisch. Journ. de Conch. xli. p. 296 (1893)[4]; Miss. Scient. Mex., Moll. ii. p. 617, t. 66. figg. 2, 2 *a*[5].

Of smaller size than *U. liebmanni*, rather even, not convex in the middle part of the length, very short and almost perpendicularly sloping before, prolonged and somewhat bent downwards behind; ventral margin largely sinuated; inside yellowish-white.

Long. 78; alt. vert. 35, alæ 30, diam. 25 millim. Vertices in $\frac{1}{5}$ long.
„ 71; „ 35, „ 33, „ 27 „ „ $\frac{1}{5}$ „

Hab. Mexico (*Sallé*[4 5]).

South America, without nearer indication of locality (*Patricio M. Paz*[1–3]).

The above-quoted descriptions and figures seem to me to apply to one and the same species. It is to be regretted that no definite indication of locality is given in either case.

23. **Unio goascoranensis.** (Tab. XXXVIII. figg. 10, 10 *a*.)

Unio goascoranensis, Lea, Proc. Acad. Phil. 1859, p. 118[1]; Journ. Acad. Phil. (2) iv. p. 258, t. 41. fig. 139[2]; Obs. Gen. *Unio*, vii. p. 76, t. 41. fig. 139[3].

Near *U. acutirostris*, but with the sides less flattened, the fore part a little more rounded, the ventral margin not sinuated, the hinder extremity less attenuated.

a. Long. 58½; alt. vert. 32, alæ 27, diam. 20 millim. Vertices in $\frac{1}{3}$ long.
b. „ 65; „ 33, „ 31, „ 23 „ „ $\frac{2}{7}$ „
a. Lea's figure; *b*. Specimen from Paso Antonio.

Hab. W. Guatemala: Paso Antonio, Rio Michatoya (*Stoll*).
W. Honduras: River Goascoran, Pacific slope of Honduras (*Leconte*[1–3]).

The two Guatemalan specimens before me, one of which is here figured, are a little more lengthened than Lea's type, but they agree so well in other respects that it is inadvisable to give them a new name.

24. **Unio tehuantepecensis.**

Unio tehuantepecensis, Crosse & Fisch. Journ. de Conch. xli. p. 296 (1893)[1]; Miss. Scient. Mex., Moll. ii. p. 618, t. 65. figg. 3, 3 *a*, 4[2].

Fore part similar to that of *U. liebmanni*; hinder half less attenuated; dorsal margin behind the summits at first nearly straight and horizontal, only from the hinder end of the lamellar teeth beginning to descend obliquely; lower half of the hinder margin obliquely truncated; ventral margin a little sinuated in its hinder half; inside whitish, with a yellowish or orange hue.

Long. 68; alt. vert. 38, alæ 36, diam. 24 millim. Vertices in $\frac{1}{3}$ long.

Hab. S.W. Mexico: near Santa Efigenia, Isthmus of Tehuantepec, State of Oaxaca, in a lake filling up the crater of a volcano (*Sumichrast*[1 2]).

Fischer and Crosse's figures differ greatly in outline, fig. 4 being more equally attenuated behind; but the latter may represent the younger state of this species.

Var. *copanensis*, n. (Tab. XXXVI. figg. 6, 6*a*.)

Fore part equally rounded above and below, not angulated; general form a little lower and more elongated; the inside in one specimen bright orange, with a bluish tint in the hinder half; in another whitish, with a faint yellowish hue.

Long. 69; alt. vert. 36, alæ 34, diam. 23 millim. Vertices in $\frac{1}{3}$ long.

Hab. HONDURAS: "Rio Copan, an affluent of the Motagua" (*v. Ihering*).

Notwithstanding the difference of locality, the two specimens sent by H. v. Ihering to the Berlin Museum agree so well with Fischer and Crosse's description and figure that I cannot separate them as a distinct species; they are, however, much worn outside.

VI. NEPHRONAIAS, Fisch. & Crosse.

25. **Unio aztecorum.** (Tab. XXXVI. figg. 2–4*a*; Tab. XXXVII. figg. 3, 3*a*, *b*.)

Unio impressus (Mus. Reg. Berolin.), Menke, Synopsis Moll. ed. 2, p. 107 (1830) (without description) [1].

? *Unio emarginatus*, Lea, Obs. Gen. *Unio*, i. p. 174, t. 9. fig. 22 (1833) [2].

Unio aztecorum, Philippi, Zeitschr. f. Malak. iv. p. 95 (1847) [3]; Abbild. neuer Conch. iii. p. 27, t. 6. fig. 2 [4]; Küster, in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, *Unio*, p. 284, t. 95. fig. 6 [5] (copied from Philippi); Fisch. & Crosse, Miss. Scient. Mex., Moll. ii. p. 607 [6].

Unio plicatulus, Charpentier, in Küster, Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, *Unio*, p. 154, t. 44. fig. 4 (1856) [7].

Oblong, rounded before and behind, gaping somewhat anteriorly; dorsal margin arcuated; ventral margin more or less sinuated; summits much advanced; periostracum yellowish-brown or dark brown, in young specimens sometimes with greenish rays; inside purple, in some specimens white; cardinal teeth small, triangular, furrowed and crenulated.

a.	Long.	112;	alt. vert.	56,	alæ	56,	diam.	$42\frac{1}{2}$	millim.	Vertices in $\frac{1}{4}$ long.
b.	,,	83;	,,	41,	,,	42,	,,	30	,,	,, $\frac{1}{4}$,,
c.	,,	71;	,,	31,	,,	35,	,,	20	,,	,, $\frac{2}{9}$,,
d.	,,	69;	,,	32,	,,	36,	,,	$21\frac{1}{2}$	,,	,, $\frac{1}{4}$,,
e.	,,	64;	,,	30,	,,	32,	,,	20	,,	,, $\frac{1}{4}$,,
f.	,,	59;	,,	29,	,,	30,	,,	20	,,	,, $\frac{1}{4}$,,
g.	,,	$51\frac{1}{2}$;	,,	26,	,,	$27\frac{1}{2}$,	,,	16	,,	,, $\frac{1}{7}$,,
h.	,,	50;	,,	$23\frac{1}{2}$,	,,	26,	,,	17	,,	,, $\frac{1}{4}$,,
i.	,,	48;	,,	23,	,,	26,	,,	14	,,	,, $\frac{1}{4}$,,

a. Very large specimen from Misantla, collected by Strebel; *b*. Large specimen from the same locality; *c*. A more elongated form, also from Misantla; *d*. Normal form from Zimapan; *e*. From Misantla, collected by Deppe; *f*. Measurements of Philippi's type, according to his figure; *g–i*. Younger specimens from Misantla.

Hab. N.E. MEXICO: Zimapan, on the Rio San Juan, southern confluent of the Panuco (*Schiede, in coll. Dunker*).

E. MEXICO: Rio de Misantla (*Deppe, Schiede, in Mus. Berol.*); Playa de Misantla (*Strebel, in Mus. Hamburg and Mus. Berol.*); Playa de Nautla (*Strebel, in Mus. Hamburg*); Mexico, without nearer indication of locality (*Liebmann*).

The outlines of this species are very variable, as will be seen by the measurements

and figures: in normal full-grown specimens of moderate size, as well as in most young ones, the height of the summits is distinctly less than half the length; in very old examples, however (as in *a* and *b*), the height of the summits is about half the length, though it is possible to see, by the lines of growth, that the same specimens, in a younger state, were also comparatively lower. Young specimens are not distinctly sinuated at the ventral margin. Generally, the colour is dull, without lustre, but very young examples (*i*) are of a shining yellow-brown.

Unio emarginatus, Lea, according to the description and figure, agrees fairly well with large well-sinuated specimens of *U. aztecorum*; but as Lea did not know the locality of his species, I refrain from using his name.

In the late Dunker's collection, now in the Berlin Museum, there are two examples, labelled "*Unio purpuriatus*, Say, Mexico, Anthony," which agree very well with smaller scarcely-sinuated specimens of *Unio aztecorum*. Say's description also, ". . . . basal margin a little compressed in the middle, and sometimes almost compressed in that part," agrees better with *U. aztecorum* than with *U. medellinus*; but as the American conchologists refer Say's name to the latter, I dare not contradict them. At all events the name *purpuriatus*, Say, cannot be used for any American species of the genus, being preoccupied by Lamarck in 1819.

Var. *strebeli*. (Tab. XXXVII. figg. 1, 1 *a*, 2, 2 *a*.)

Unio strebeli, Lea, Proc. Acad. Phil. 1866, p. 133[8]; Journ. Acad. Phil. (2) vi. p. 318, t. 51. fig. 131[9]; Obs. Gen. *Unio*, xii. p. 78, t. 51. fig. 131[10]; Fisch. & Crosse, Miss. Scient. Mex., Moll. ii. p. 594[11].

More abbreviated, the height of the summits being more than half the length of the shell.
a. Long. 94; alt. vert. 49, alæ 50, diam. 33 millim. Vertices in $\frac{2}{7}$ long.
b. „ 73; „ 42, „ 39, „ 24 „ „ $\frac{2}{7}$ „

Hab. E. Mexico: Playas of Misantla and Nautla, with the typical form (*Strebel, in Mus. Hamburg and Mus. Berol.*); Vera Cruz (*Strebel* [8–11]).

This seems to be an individual variation, chiefly occurring in large-sized specimens, rather than a geographical variety, Strebel's examples from Misantla having been collected apparently with the normal form. Lea mentions two diverging raised lines descending from the summits towards the hinder extremity, but, according to his figure, these must be very obtuse and blunt, as they can be seen in almost every species of the genus.

Var. *soledadensis*.

Unio soledadensis, Crosse & Fisch. Journ. de Conch. xli. p. 111 (1893)[12]; Miss. Scient. Mex., Moll. ii. p. 608, t. 69. figg. 3, 3 *a*, *b*[13].

Summits somewhat less advanced.

Hab. E. Mexico: Soledad, State of Vera Cruz (*Sallé* [12 13]).

Var. *chapalanus*, n. (Tab. XXXVI. figg. 5, 5*a*.)

Somewhat higher comparatively, especially in its hinder part; brownish-yellow, with some green rays; ventral margin scarcely concave; cardinal teeth more feeble; inside white.

Long. 60; alt. vert. 31½, alæ 32, diam. 20 millim. Vertices in ¼ long.

Hab. CENTRAL MEXICO: Laguna de Chapala, a large lake situated on the elevated plain of Central Mexico, discharging its waters by the Rio Grande de Santiago into the Pacific (*Deppe and Schiede, in Mus. Berol.*).

From *U. poeyanus*, which belongs also to the Pacific slope of Mexico, this form is distinct by the comparatively higher shell, the height being in *chapalanus* a little more than half, in *poeyanus* a little less than two-fifths the length.

26. **Unio popei.**

Unio popeii, Lea, Proc. Acad. Phil. 1857, p. 102 [1]; Journ. Acad. Phil. (2) iv. p. 372, t. 66. fig. 197 [2]; Obs. Gen. *Unio*, viii. p. 54, t. 66. fig. 197 [3]; Sowerby, in Reeve's Conch. Icon. xvi., *Unio*, t. 81. fig. 430 [4]; Stearns, Proc. U.S. Nat. Mus. xiv. p. 104 (1891) [5]; Fisch. & Crosse, Miss. Scient. Mex., Moll. ii. p. 605 [6].

Lower and more compressed than the preceding (*U. aztecorum*), the fore part more produced, the hinder part comparatively more elevated.

Hab. N.E. MEXICO: Rio Salado, Nuevo Leon (*Capt. Pope* [1 5]).

Also occurs in Texas.

27. **Unio poeyanus.**

Unio poeyanus, Lea, Proc. Acad. Phil. 1857, p. 85 [1]; Journ. Acad. Phil. (2) iii. p. 315, t. 32. fig. 30 [2]; Obs. Gen. *Unio*, vi. p. 35, t. 32. fig. 30 [3]; Sowerby, in Reeve's Conch. Icon. xvi., *Unio*, t. 90. fig. 486 [4]; Fisch. & Crosse, Miss. Scient. Mex., Moll. ii. p. 606 [5].

Somewhat smaller than *U. popei*, and lower, especially in the hinder half; the ventral margin more sinuated; periostracum finely granulated.

Hab. S.W. MEXICO: Rio de las Balsas, near Coyucan, Guerrero (*Poey* [1–5]).

28. **Unio microdon.** (Tab. XXXV. figg. 1, 1 *a–c*.)

Unio microdon, v. Mart. Sitzungsb. Ges. nat. Freunde, Berlin, 1887, p. 107 [1].

Testa elliptica, modice convexa, valde inæquilatera, solida, concentrice leviter striatula, intus albida; antice rotundata, margine ventrali magis ascendente, postice obtuse declivi rostrata; margo ventralis medio et postice subrectus; vertices subplani, detriti; dentes cardinales perparvi, tuberculiformes, in valva dextra unus subtetragonus, lævis, apice leviter crenatus, in valva sinistra duo, anterior subtrigonus, lævis, posterior compressus, acie distincte crenulata; dentes laterales elongati, leviter arcuati.

a. Long. 107; alt. vert. 57, alæ 48, diam. 34 millim. Vertices in ⅔ long.
b. „ 93; „ 50, „ ?, „ 29 „ „ „ ⅕ „

Hab. N. GUATEMALA: Rio de las Salinas (*Stoll* [1]).

VII. Simonaias, Fisch. & Crosse.

29. Unio cuprinus.

Unio cuprinus, Lea, Trans. Am. Phil. Soc. iv. p. 94 (1830) [1]; Obs. Gen. *Unio*, i. p. 104 [2]; Synops. Fam. Unionidæ, ed. 4, p. 61 (1870) [3].

Unio calamitarum, Morelet, Test. Noviss. i. p. 30 (1849) [4]; Fisch. & Crosse, Miss. Scient. Mex., Moll. ii. p. 612 [5].

Thick-shelled, compressed, unequilateral, with a very obtuse ridge descending from the summits towards the hinder extremity, concentrically furrowed, the furrows becoming stronger near the ventral margin; reddish-brown; beaks flat, not prominent; inside very shining, rose-coloured, rarely almost white; cardinal teeth moderately strong, triangular, furrowed; lateral (posterior) teeth rather long, nearly straight.

a. *nephriticus*.

Unio cuprinus, Lea, loc. cit. t. 12. fig. 24 [6]; Chenu, Illustr. Conch., *Unio*, t. 11. fig. 3 [7]; Sowerby, in Reeve's Conch. Icon. xvi., *Unio*, t. 66. fig. 336 [8].

Unio calamitarum ("nunc *reniformis*"), Morelet, loc. cit. [9] (nec *U. reniformis*, F. Schmidt, Rossm. 1836).

Unio calamitarum, var. δ. *nephritica*, Fisch. & Crosse, loc. cit. p. 13 [10].

Ventral margin distinctly sinuated.

Long. 53; alt. vert. 22, alæ 27½, diam. 21 millim. Vertices in ¼ long.
„ 60; „ 29, „ 34, „ ? „ „ „ ⅙? „

Hab. S.E. Mexico: in the stream Baluntie, near Palenque (*Morelet* [9]); Mexico, without nearer indication of locality (*Poinsett* [6 7]).

b. *tabascoensis*.

Unio calamitarum ("vel *rhomboidea*"), Morelet, loc. cit. p. 30 [11].

Unio calamitarum, var. *prolongata*, Fisch. & Crosse, loc. cit. p. 612, t. 63. figg. 5, 5 *a* [12].

Unio tabascoensis, Charpentier, in Küster, Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, p. 153, t. 44. fig. 3 (1856) [13].

Unio mexicanus, coll. Paetel [14].

Elongated, posterior dorsal and ventral margins straight, hinder extremity almost perpendicularly truncated.

Long. 52; alt. vert. 24, alæ 26, diam. 18 millim. Vertices in ⅕ long.
„ 64; „ 34, „ 35, „ 22 „ „ „ ¼ „
„ 58; „ 29, „ 29, „ 17½ „ „ „ ¼ „

Hab. S.E. Mexico: Tabasco (*Reip, teste Charpentier*), in the stream Baluntie, near Palenque (*Morelet* [11]).

c. *persulcatus*.

? *Unio metallicus*, Say, New Harmony Disseminator of Useful Knowledge, 1831, p. 6 [15].

Unio persulcatus, Lea, Proc. Acad. Phil. 1859, p. 155 [16]; Obs. Gen. *Unio*, vii. p. 73, t. 40. fig. 135 [17] (nec Sowerby, in Reeve's Conch. Icon.).

Unio mexicanus, Parreyss, in Mus. Berol. [18]

Ventral margin nearly straight; hinder extremity obliquely truncated.

Long. 50; alt. vert. 24, alæ 26, diam. 15 millim. Vertices in ⅖ long.
„ 51; „ 26, „ 27, „ 17 „ „ „ ¼ „

Hab. Mexico, without nearer indication of locality (*Hanley* [16 17]).

d. *coloratus.*

Unio coloratus (Charpentier), Küster, in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, *Unio*, p. 155, t. 44. fig. 6 (1856) [19]; Fisch. & Crosse, loc. cit. p. 599 (part.) [20].

More abbreviated, with slightly convex dorsal margin and straight ventral margin.
Long. 49; alt. vert. 28, alæ 28, diam. 18 millim. Vertices in $\frac{3}{10}$ long.

Hab. MEXICO, without nearer indication of locality (*Charpentier*).

e. *subventralis.* (Tab. XXXVI. figg. 1, 1 *a*, *b*.)

Ventral margin distinctly convex.
Long. 55; alt. vert. 29, alæ 29, diam. 18 millim. Vertices in $\frac{2}{9}$ long.

Hab. S.E. MEXICO: Tabasco (*Parreyss, in coll. Dunker, nunc Mus. Berol.*).

f. *arcuans*, n.

Unio calamitarum ("*ovata*"), Morelet, loc. cit.[21]

Unio calamitarum, Sowerby, in Reeve's Conch. Icon. xvi., *Unio*, t. 14. fig. 385 [22].

Unio calamitarum, var. *arcuans*, Fisch. & Crosse, loc. cit. p. 612, t. 64. figg. 5, 5 *a* [23].

Abbreviated, posterior dorsal margin elevated and arcuated.
Long. 47; alt. vert. 25, alæ 28, diam. 17 millim. Vertices in $\frac{1}{5}$ long.
„ 43; „ 22, „ 25, „ ? „ „ $\frac{1}{5}$ „

Hab. S.E. MEXICO: in the stream Baluntie, near Palenque (*Morelet* [21]).

This species corresponds to the section *Simonaias* of Fischer and Crosse. Morelet noted its variability in outline, and on this character Fischer and Crosse distinguished several varieties, though they maintain the species described by other authors as distinct. Lea [1 2] describes the ventral margin of his *U. cuprinus* as "disposed to be straight," and the general form as "reversely ovate," but the figure given by him shows the ventral margin to be distinctly sinuate, and the general outline kidney-shaped, not ovate; it seems, therefore, that he also had specimens of different outline before him. As it is not possible to say which form is really the type of *U. cuprinus*, I have treated each of them as a variety, and quoted only the general descriptions, which comprise several forms, under the head of the species, just as I have done with *Pachychilus glaphyrus*, anteà, p. 438. Sowerby's figure 385 [22] corresponds, on the whole, to the var. *arcuans*, but it has the ventral margin sinuated, and thus forms a link to the var. *nephriticus*.

30. **Unio dysoni.**

? *Unio rugulosus* (Charpentier), Küster, in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, *Unio*, p. 154, t. 44. fig. 5 (1856) [1].

Unio dysoni, Lea, Proc. Acad. Phil. 1859, p. 152 [2]; Journ. Acad. Phil. (2) iv. p. 252, t. 39. fig. 132 [3]; Obs. Gen. *Unio*, vii. p. 70, t. 39. fig. 132 [4].

Near *U. cuprinus*, but more produced before, more rounded behind and below; inside whitish.

Hab. HONDURAS (*Dyson* [2–4]).

Unio rugulosus, Charp., although said to be Australian, is so very like *U. dysoni* that I strongly suspect the two are identical, although I have not seen a specimen. *U. rugulosus* is mentioned in E. Smith's valuable paper on the Australian freshwater shells [Journ. Linn. Soc., Zool. xvi. p. 312 (1882)], but no additional information is given respecting it.

31. **Unio macnieli.**

Unio macnielii, Lea, Proc. Acad. Phil. 1869, p. 124[1]; Journ. Acad. Phil. (2) viii. p. 25, t. 8. fig. 22[2]; Obs. Gen. *Unio*, xiii. p. 29, t. 8. fig. 22[3].

Hab. NICARAGUA: Rio Gigillillo, Corcuera (*McNiel* [1–3]).

32. **Unio yzabalensis.** (Tab. XXXIX. figg. 9-11 *a*.)

Unio yzabalensis, Crosse & Fisch. Journ. de Conch. xl. p. 296 (1892)[1]; Miss. Scient. Mex., Moll. ii. p. 597, t. 64. figg. 4, 4 *a*, *b*[2].

? *Unio scamnatus* (Morelet), Lea, Obs. Gen. *Unio*, vii. p. 77[3].

Testa rhomboidea, paulum et æqualiter convexa, liris concentricis inæqualibus confertis, nonnullis bifurcatis vel anastomosantibus sculpta, ferrugineo-fusca, antice sat producta, modice arcuata, supra levius arcuata, infra magis ascendens, verticibus in $\frac{2}{5}$–$\frac{1}{3}$ longitudinis sitis, margine dorsali postico valde arcuato, margine postico subtruncato, margine ventrali antice valde ascendente, medio subrecto vel subsinuato; dentes cardinales sat validi, subtriangulares, sulcati, secundus valvæ sinistræ minor; facies interna pallide purpurea vel albida.

a.	Long. 62;	alt. vert.	38,	alæ	35,	diam.	$23\frac{1}{2}$	millim.	Vertices in $\frac{2}{5}$	long.
b.	,, 51;	,,	$30\frac{1}{2}$,	,,	34,	,,	$15\frac{1}{2}$	,,	,, $\frac{1}{3}$	,,
c.	,, $45\frac{1}{2}$;	,,	28,	,,	26,	,,	$15\frac{1}{2}$	,,	,, $\frac{1}{3}$	,,
d.	,, 42;	,,	26,	,,	$24\frac{1}{2}$,	,,	13	,,	,, $\frac{1}{3}$	,,
e.	,, 48;	,,	27,	,,	27,	,,	16	,,	,, $\frac{1}{3}$	,,

a, *c*, *d*, *e*. Specimens from Panzos; *b*. From Fischer and Crosse's description and figure.

Hab. GUATEMALA: Panzos, in the Polochic valley (*Conradt*); Lake Yzabal (*Bocourt* [1 2]).
HONDURAS: Comayagua (*Leconte* [3]).

I have given a fresh diagnosis of this species, as among the specimens collected by Conradt there are some of much larger size than the type described by Fischer and Crosse. *U. yzabalensis* is so near the Cuban *U. scamnatus*, Morelet *, that I think it very probable that *U. scamnatus*, Lea [3], from Honduras, may belong to the present

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* *Unio scamnatus*, Morelet, and *U. gundlachi*, Dunker, both from Cuba, are treated as one species by Lea (*loc. cit.*), but they are separated as distinct by Dunker (Malak. Blätt. v. pp. 228, 229) and by Arango (Contribucion Faun. Mal. de Cuba, p. 144). As there is some confusion regarding these Cuban forms, I have re-characterized them, after having compared the specimens in the late Dunker's collection, now in the Berlin Museum, with Morelet's description and Sowerby's figure.

Unio scamnatus.

Unio scamnatus, Morelet, Test. Noviss. i. p. 30 (1849).

Unio gundlachi, Dunker, Malak. Blätt. v. p. 228 (1858).

Elliptic-oval, sulcated, compressed; hinder half as high as or higher than the fore half; ventral margin

species. It differs, however, from all the Cuban specimens of *U. scamnatus*, Morelet, in the Berlin Museum, in the more quadrate form, the height equalling the length (in the Cuban examples which most nearly approach it the height is only two-thirds of the length), the more abruptly descending hinder dorsal margin, the rather less compressed form of the whole shell, and the greater strength of the cardinal teeth. The umbones, when well preserved, are strongly furrowed concentrically. The relative proportion of the length to the height of the shell varies in specimens from the same locality between about 3 : 2 to 2 : 1 (specimen *d*).

At first sight this specimen resembles *U. litoralis*, Cuv., from Western Europe; it differs, however, on closer inspection, in having the concentric ridges closer together, those in the umbonal region very distinct and regular, while in *U. litoralis* they are more depressed and distant, and in the umbonal region undulated.

33. **Unio championi**, sp. n. (Tab. XXXVIII. figg. 9, 9 *a*.)

Testa oblongo-elliptica, concentrice dense et inæqualiter striata, fusca, in regione umbonali pallidior, obscure viridi-radiata, et pone umbones lirulis nonnullis radiantibus brevibus, interdum duabus, sulcum includentibus, magis elongatis, sculpta, antice rotundata, verticibus parum prominulis, margine dorsali posteriore primum leviter declivi, dein magis descendente, extremitate postica rotundato-truncata, margine ventrali leviter convexo, antice et postice subæqualiter ascendente; dentes cardinales subcompressi, margini paralleli, læves; facies interna cærulescens.

Long. 30; alt. vert. 17, alæ 16, diam. $6\frac{1}{2}$ millim. Vertices in $\frac{2}{5}$ long.

Hab. W. Guatemala: Paso Antonio, in the Pacific coast-region (*Champion*).

Differs from *U. hjalmarsoni*, Dunk., in having the fore part shorter and more broadly rounded, and the concentric striæ more feeble and not so broad, as well as in the

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arcuated before and more abruptly ascending behind, straight or very slightly convex at the middle; height of the shell more than half its length; summits in $\frac{1}{3}$–$\frac{2}{7}$ of the length; inside bluish-white.

a. Long. 55; alt. vert. 30, alæ ?, diam. 17 millim. (Morelet).
b. „ 58; „ 32, „ 34, „ 18 „
c. „ 83; „ 37, „ 37, „ $22\frac{1}{2}$ „
d. „ 64; „ 33, „ 35, „ 18 „
} (specimens in Berlin Museum).

Hab. Cuba: Cacajajicara (*Morelet*), Rio Taco (*Gundlach*).

Unio proclinatus, sp. n.

Unio scamnatus (Morelet), Dunker, Malak. Blätt. v. p. 229 (1858).
Unio gundlachi (Dunker), Sowerby, in Reeve's Conch. Icon. xvi., *Unio*, t. 46. fig. 248.

Elongate, sulcated, compressed; fore part very short, abruptly rounded; hinder half lower, strongly compressed; ventral margin conspicuously ascending before, subsinuated at the middle, scarcely ascending behind; height of the shell equalling half its length or somewhat less; summits in $\frac{2}{9}$–$\frac{1}{4}$ of the length; cardinal teeth somewhat stronger; inside orange or somewhat purplish.

a. Long. 84; alt. vert. 40, alæ 36, diam. 20 millim.
b. „ 60; „ 30, „ $27\frac{1}{2}$, „ 16 „
c. „ 58; „ 25, „ 28, „ 14 „

Hab. Cuba: Rio Taco and Gibara, in the eastern part of the island, and Pinar del Rio, farther west (*Gundlach, in Mus. Berol.*).

sculpture and coloration of the umbonal region. The furrow, bordered by two ridges, descending from the summits backward, is also visible in *U. hjalmarsoni*, but in the present species it is distinct to near the hinder end in one only of the six specimens seen, the furrow, like the radial ridges, scarcely extending beyond the umbonal region in the others.

34. **Unio hjalmarsoni.** (Tab. XXXVIII. figg. 11, 11 *a*.)

Unio hjalmarsoni, Dunker, Malak. Blätt. v. p. 227 (1858) [1].

Rather elongate, elliptic, moderately compressed; dorsal margin before the summits somewhat descending, behind them at first nearly horizontal, then arcuate; ventral margin conspicuously ascending in the fore part, nearly straight in the middle and hinder parts, the fore half of the shell thus appearing somewhat angularly produced, and hinder extremity almost perpendicularly cut off. Summits in one-third of the whole length. Concentric plaits over the whole surface, rather strong, close together, some anastomosing. Periostracum dirty yellow. Cardinal teeth somewhat thick, oblique, feebly furrowed, and not crenulated. Inside bluish-white.

Long. 36; alt. vert. $18\frac{1}{2}$, alæ 17, diam. 11 millim.

Hab. Honduras: Rio Chamelicon, on the confines of Guatemala (*Hjalmarson* [1]).

Here figured for the first time, from Dunker's type, now in the Berlin Museum.

35. **Unio nuculinus.** (Tab. XXXIX. figg. 6, 6 *a*, *b*.)

Unio nuculinus, Philippi, Zeitschr. f. Malak. v. p. 176 (1848) [1].

Of small size, elongate, elliptic, pale greenish, with regular strong concentric ridges; fore part somewhat produced, hinder part straightly beaked; ventral margin ascending about as much behind as the dorsal margin descends, with a narrow furrow descending from the summits to the hinder extremity. Inside silvery-white. Cardinal teeth compressed, moderate in size—in the left valve two, one behind the other; in the right valve one, larger, spoon-shaped.

a. Long. $17\frac{1}{2}$; alt. vert. 10, alæ 9, diam. 7 millim. Vertices in $\frac{1}{3}$ long.
b. „ 16; „ $9\frac{1}{2}$, „ 7, „ 7 „ „ $\frac{1}{3}$ „

Hab. Nicaragua (*Largilliert* [1]).

Two specimens in the late Dunker's collection, now in the Berlin Museum. They do not appear to be very young, to judge from the solidity of the shell and the extent of erosion. The measurements given by Philippi indicate a somewhat greater height.

VIII. Lampsilis, Raf.

36. **Unio discus.**

Unio discus, Lea, Trans. Am. Phil. Soc. vi. p. 74, t. 18. fig. 57 (1838) [1]; Obs. Gen. *Unio,* ii. p. 74, t. 18. fig. 57 [2], and iii. p. 72 [3]; Hanley, Cat. Rec. Bivalv. p. 197, t. 22. fig. 12 [4]; Chenu, Illustr. Conch., *Unio,* t. 19. fig. 6 [5]; ? Sowerby, in Reeve's Conch. Icon. xvi., *Unio,* t. 62. fig. 310 [6]; Fisch. & Crosse, Miss. Scient. Mex., Moll. ii. p. 567 (part.) [7].

Anterior part short, only one-fourth of the whole length, upper anterior margin abruptly descending; hinder

extremity somewhat rostrated and in its lower half perpendicularly truncated. Outside blackish-brown, with strong concentric striæ; inside pale purple.

Long. 131; alt. vert. 82, alæ 69 ?, diam. 40 millim. Vertices in $\frac{1}{4}$ long.

Hab. N.E. Mexico: Rio Moctezuma (*Dr. Blanding* [3]).

Lea [3] gives "River Moctezuma, Central America," as locality for this and two other species of *Unio* (*U. nicklinianus* and *U. tampicoensis*), but there can scarcely be any doubt that the river Moteuzuma, a southern confluent of the Panuco, is meant. Moctezuma is the name of a town, a little more to the north, in the State of San Luis Potosi.

If it were not for the var. *connectens*, I should treat *U. discus* as distinct from *U. panucoensis*.

Var. *connectens*, n.

Unio panucoensis (v. d. Busch), Küster, in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, *Unio*, p. 242, t. 81. fig. 1 [8].

Unio mexicanus, Sowerby, in Reeve's Conch. Icon. xvi., *Unio*, t. 55. fig. 281 (1867) [9].

More elongate than Philippi's type of *U. panucoensis*, the hinder part of the shell longer and more perpendicularly truncated, the anterior part as in *U. discus*. Sculpture similar. Inside pale orange or (as in the specimen before me) salmon-coloured.

a. Long. 134; alt. vert. 78, alæ 85, diam. 38 millim. Vertices in $\frac{1}{3}$ long.
b. „ 130; „ 81, „ 71, „ 41 „ „ $\frac{1}{3}$ „
c. „ 114; „ 71, „ 66, „ ? „ „ $\frac{1}{3}$ „

a. From Küster's figure; *b*. Specimen in the Berlin Museum, from Albers's collection; *c*. Sowerby's figure.

Hab. N.E. Mexico: Rio Panuco, near Tampico (*v. d. Busch* [8]).

Probably only an individual variety of *U. panucoensis*, although the general form seems to be rather different at first sight. Küster [8] says that the inside is either violet, flesh-coloured, or white; but as he does not distinguish this form from typical *panucoensis*, it is not certain whether all these colours are to be found in it.

The relatively great difference in the height of the wing is due to the fact that in Küster's specimen the hinder part of the ventral margin is more ascending than in the example in the Berlin Museum.

Var. *panucoensis*. (Tab. XXXIII. figg. 2, 2 *a*, *b*.)

Unio panucoensis, v. d. Busch, in Philippi's Abbild. neuer Conch. i., *Unio*, p. 3, t. 2. figg. 1, 2 (1843) [10].

Unio lapidosus (Villa, MS.), Kobelt, in Rossmässler's Icon. d. Land- und Süssw.-Moll. (2) vi. p. 90, t. 176. fig. 1120 (1893) [11].

Unio discus (Lea), Fisch. & Crosse, Miss. Scient. Mex., Moll. ii. p. 567 (part.) [12].

Triangularly elliptic, much compressed, anterior part (before the summits) projecting, rounded; ventral margin nearly straight at the middle, and almost equally arcuate before and behind; summits in $\frac{1}{3}$–$\frac{2}{5}$ of the length. Outside brown, with coarse concentric unequal striæ; inside white or pale purple.

a. Long. 114; alt. vert. 79, alæ 75, diam. ? millim. Vertices $\frac{1}{3}$ long.
b. „ 126; „ 85, „ 69, „ 41 „ „ $\frac{3}{8}$ „
c. „ 122; „ 86, „ 76, „ 44 „ „ $\frac{3}{8}$ „ (figured).
d. „ 122; „ 81, „ 76½, „ 37 „ „ $\frac{1}{3}$ „
e. „ 126; „ 85, „ 75, „ 37 „ „ $\frac{1}{3}$ „

a. Type, from Philippi's figure[10]; *b–d*. Specimens in the Berlin Museum; *e*. Villa's *U. lapidosus*. Inside white in *a*, *b*, *d*, *e*; pale purple in *c*.

Hab. N.E. Mexico: Rio Panuco, at Tampico[10] (*Dr. H. Wilckens*, 1842, *according to a label in the late Dunker's collection*).

The type of *U. lapidosus*, sent to me by Villa himself about 1855, is labelled "Euphrat. river." I purposely omitted the species from my enumeration of the fresh-water shells of Western Asia, 'Vorderasiatische Conchylien,' pp. 67, 68 (1874), on account of its being so very different from the other forms known from that region, but communicated it to Dr. Kobelt when he was working on the same subject in 1893.

Villa's shell now proves to be exactly like *U. panucoensis*; the locality quoted must therefore be erroneous.

37. **Unio tampicoensis.** (Tab. XXXIII. figg. 1, 1 *a*, *b*.)

Unio tampicoensis, Lea, Trans. Am. Phil. Soc. vi. p. 24, t. 7. fig. 18 (1836)[1]; Obs. Gen. *Unio*, ii. p. 24, t. 7. fig. 18[2], and iii. p. 72[3]; Hanley, Cat. Rec. Bivalv. p. 188, t. 20. fig. 36[4]; Chenu, Illustr. Conch., *Unio*, t. 21. fig. 5[5]; Sowerby, in Reeve's Conch. Icon. xvi., *Unio*, t. 57. fig. 291[6]; Fisch. & Crosse, Miss. Scient. Mex., Moll. ii. p. 586[7].

Elliptically rounded, with smooth, somewhat shining, greenish-brown periostracum; ventral margin straight at the middle, well rounded before and behind; summits in $\frac{1}{3}$–$\frac{2}{7}$ of the length. Inside white, at the posterior laminar teeth rose-coloured, in some specimens the whole inside rose or purple. Anterior teeth comparatively small, moderately strong.

a. Long. 112; alt. vert. 64, alæ 66, diam. 42 millim. Vertices in $\frac{2}{7}$ long.
b. „ 103; „ 62, „ 60, „ 35 „ „ $\frac{2}{7}$ „
c. „ 97½; „ 65, „ 59, „ 37½ „ „ $\frac{1}{3}$ „

a. From Lea's figure of the type[1 2]; *b* and *c*. Specimens in the Berlin Museum; *b* certainly, *c* probably, obtained from v. d. Busch.

Hab. N.E. Mexico: Rio Tampico (*Ronaldson*[1 2]); near Tampico (*coll. Albers*); Rio Moctezuma (*Blanding*[3]).

E. Mexico: Rio Medellin, ten miles south of Vera Cruz (*Dr. Burrough*[1 2]).

Also occurs in the Rio Pecos, Texas (*Lloyd*).

The two specimens of this *Unio* before me, one (*b*) from Albers's, the other (*c*) from Paetel's collection (here figured), differ remarkably in the proportion of the length to the height, as will be seen from the measurements given, but they agree so well in all other respects that I cannot doubt their identity; both are marked here and there with short linear descending impressions (see figure), which I do not find mentioned in any description. They have the inside white, with a rosy hue on the upperside of the laminar posterior teeth.

Var. *tecomatensis*.

Unio tecomatensis, Lea, Proc. Am. Phil. Soc. ii. p. 30 (1841) [8]; Trans. Am. Phil. Soc. (2) viii. p. 234, t. 21. fig. 48 [9]; Obs. Gen. *Unio*, iii. p. 72, t. 17. fig. 48 [10]; Chenu, Illustr. Conch., *Unio*, t. 30. fig. 6 [11]; Fisch. & Crosse, Miss. Scient. Mex., Moll. ii. p. 589, t. 65. fig. 6, and t. 66. figg. 4, 4 *a* [12].

Unio tampicoensis (Lea), Küster, in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, *Unio*, p. 275, t. 93. fig. 1 [13].

More convex, anterior tooth somewhat stronger; inside purple-violet.

a. Long. 89; alt. vert. 55, alæ 58, diam. 41 millim. Vertices in $\frac{1}{3}$ long.
b. „ 98; „ 64, „ 61, „ 40 „ „ $\frac{1}{3}$ „

Hab. E. Mexico: Rio Tecomate, near Tlacotalpam, State of Vera Cruz (*Dr. Burrough* [8–12]); Rio Cosamaloapam, an affluent of Rio Alvarado, near Chacoltianguis (*Sallé* [13]).

Var. *umbrosus*. (Tab. XXXV. figg. 3–5 *b*.)

Unio tampicoensis (younger specimens), Lea, Obs. Gen. *Unio*, ii. p. 24 [14].

Unio umbrosus, Lea, Proc. Acad. Phil. viii. p. 95 (1857) [15]; Journ. Acad. Phil. (2) iii. p. 313, t. 30. fig. 26 [16]; Obs. Gen. *Unio*, vi. p. 31, t. 30. fig. 26 [17]; Sowerby, in Reeve's Conch. Icon. xvi., *Unio*, t. 23. fig. 170 [18]; Stearns, Proc. U.S. Nat. Mus. xiv. p. 103 (1891) [19]; Fisch. & Crosse, Miss. Scient. Mex., Moll. ii. p. 587, t. 67. figg. 1, 1 *a*, *b* [20].

Somewhat more oblong, with straighter ventral margin; outside rather blackish, inside pale purple, in some specimens with an orange band along the pallial line. In full-grown specimens (the young one, *h*, excepted) the middle of the inside is beset with a number of granules, probably of extraneous origin, but fixed to the shell by the last layer of calcareous matter.

a. Long. 89; alt. vert. 48, alæ 41$\frac{1}{2}$, diam. 35 millim. Vertices in $\frac{2}{7}$ long.
b. „ 97; „ 50, „ 54, „ 37 „ „ $\frac{2}{7}$ „
c. „ 84; „ 47, „ 52, „ 32 „ „ $\frac{1}{3}$ „
d. „ 77; „ 45, „ 45$\frac{1}{2}$, „ 29 „ „ $\frac{1}{3}$ „
e. „ 77; „ 42, „ 50, „ 31 „ „ $\frac{2}{7}$ „
f. „ 69; „ 39, „ 44, „ 29 „ „ $\frac{1}{3}$ „
g. „ 60; „ 33, „ 35, „ 24 „ „ $\frac{1}{3}$ „
h. „ 57; „ 30, „ 33, „ 19 „ „ $\frac{2}{7}$ „

a. From Lea's figure; *d*. A specimen collected by Strebel in the Medellin river, unusually inflated behind, probably a female; *b*, *c*, *e–g*. Specimens collected by H. H. Smith; *h*. The youngest of Strebel's examples.

Hab. N.E. Mexico: Rio Salado, State of Nuevo Leon (*Lloyd* [19]).
E. Mexico: Rio Medellin (*Dr. Burrough* [15–17], *Sallé* [20], *Strebel*, *H. H. Smith*).

The above-mentioned granules are probably grains of sand introduced into the interior of the shell, and therefore not of specific value, but it must be noted that they are found in all known full-grown specimens: Lea does not mention them in the description, though they are visible in his figure. They may be due to a peculiarity of the locality.

The specimen *c* somewhat approaches *U. alienigenus*, the hinder part being more inflated than usual.

38. **Unio berlandieri.**

Unio berlandieri, Lea, Proc. Acad. Phil. ix. p. 101 (1857) [1]; Journ. Acad. Phil. (2) iv. p. 369, t. 65. fig. 194 [2]; Obs. Gen. *Unio*, viii. p. 51, t. 65. fig. 194 [3]; Sowerby, in Reeve's Conch. Icon. xvi., *Unio*, t. 23. fig. 108 [4]; Pilsbry, Nautilus, v. p. 76 [5]; Fisch. & Crosse, Miss. Scient. Mex., Moll. ii. p. 584 [6].

Much inflated, with very prominent vertices, otherwise similar to the preceding (*U. tampicoensis*).

Hab. N.E. Mexico: Matamoros and Tamaulipas (*Berlandier* [1–3 6]).

Also in the Colorado river, near Austin, Texas (*McDaniel* [5]).

39. **Unio alienigenus.** (Tab. XXXV. figg. 2, 2 *a*.)

Unio alienigenus, Crosse & Fisch. Journ. de Conch. xli. p. 294 (1893) [1]; Miss. Scient. Mex., Moll. ii. p. 590, t. 65. figg. 5, 5 *a*, and t. 66. fig. 3 [2].

Elliptic, more inflated and higher in the hinder part; anterior teeth feeble, more or less compressed. Inside white or pale yellowish, in some specimens with a few scattered granules.

a. Long. 82; alt. vert. 51, alæ 48, diam. 30 millim. Vertices in $\frac{1}{3}$ long.
b. „ $67\frac{1}{2}$; „ 36, „ $38\frac{1}{2}$, „ 27 „ „ $\frac{1}{3}$ „
c. „ $59\frac{1}{2}$; „ $30\frac{1}{2}$, „ 34, „ 24 „ „ $\frac{1}{3}$ „

a. Fischer and Crosse's type-specimen; *b* and *c*. Two smaller, but probably full-grown, specimens in the Berlin Museum, from Dunker's collection, the smaller one given by Anthony.

Hab. E. Mexico: Coatzocoalcos, State of Vera Cruz (*Sallé* [1 2]); Mexico, without nearer indication of locality (*Parreyss and Anthony, in coll. Dunker*).

The two specimens in the Berlin Museum have scattered granules on the inside, as in *U. tampicoensis*, var. *umbrosus*, but they are absent in Fischer and Crosse's types.

40. **Unio sapotalensis.**

Unio sapotalensis, Lea, Proc. Am. Phil. Soc. ii. p. 30 (1841) [1]; Trans. Am. Phil. Soc. (2) viii. p. 233, t. 21. fig. 47 [2]; Obs. Gen. *Unio*, iii. p. 71, t. 17. fig. 47 [3]; Chenu, Illustr. Conch. t. 33. fig. 4 [4]; Sowerby, in Reeve's Conch. Icon. xvi., *Unio*, t. 91. fig. 495 (copied from Lea) [5]; Fisch. & Crosse, Miss. Scient. Mex., Moll. ii. p. 600 [6].

Hab. E. Mexico: Rio Sapotal, near Tlacotalpam, State of Vera Cruz (*Dr. Burrough* [1–3]).

Conspicuous on account of its numerous dark green rays.

41. **Unio computatus.**

Unio computatus, Crosse & Fisch. Journ. de Conch. xli. p. 295 (1893) [1]; Miss. Scient. Mex., Moll. ii. p. 601, t. 67. figg. 2, 2 *a* [2].

Hab. E. Mexico: near Coatzocoalcos, State of Vera Cruz (*Sallé* [1 2]).

Perhaps a variety of the preceding, from which it differs in the larger size, the more swollen shell, and the more feeble cardinal teeth.

42. **Unio cognatus.**

Unio cognatus, Lea, Proc. Acad. Phil. 1860, p. 306[1]; Journ. Acad. Phil. (2) iv. p. 368, t. 65. fig. 193[2]; Obs. Gen. *Unio*, viii. p. 50, t. 65. fig. 193[3]; Fisch. & Crosse, Miss. Scient. Mex., Moll. ii. p. 662[4].

Oval, rather thick and swollen, yellowish-green, with dark rays; cardinal teeth strong.

Hab. N.E. Mexico: Rio Salado, State of Nuevo Leon (*Berlandier* 1–4).

Allied to the North-American *U. venustus* and *U. zigzag*.

IX. Elliptio, Raf.

43. **Unio rubicundus,** sp. n. (Tab. XXXIV. figg. 3, 3 *a*.)

Testa oblonga, trapezoidea, concentrice grosse striata, striis nonnullis subnodulosis, in declivitate posteriore pliculis numerosis obliquis sursum arcuatis sculpta, rufo-fusca, parte antica longiuscule rotundata, parte postica declivi-rostrata et subperpendiculariter truncata, linea angulari a verticibus descendente, margine ventrali antice valde ascendente, medio et postico recto; dentes cardinales validi, triangulares, sulcati et crenulati; facies interna purpurea, linea palliali antice a margine valde remota.

Long. 89; alt. vert. 57, alæ 44, diam. 34 millim. Vertices in $\frac{1}{3}$ long.

Hab. N. Guatemala: Coban (*Conradt*).

Although a single valve only of this species has been obtained, I am compelled to propose a new name for it. In size and outlines *U. rubicundus* so nearly resembles *U. corium*, Sowerby, that, at first sight, it seemed to be nothing more than a smooth variety of that species; the sculpture, however, is different: this is due to the presence of coarse concentric striæ, some of those on the umbonal region rising here and there into flat prominences, but the summits themselves (which, fortunately, are well preserved) are simply concentrically striated; there is no trace of granulated structure. On the hinder slope there are small plaits, bent upwards, as in *U. pliciferus*. The cardinal teeth are rather strong. The sculpture is unlike that of the species of the subgenus *Psoronaias*, and, as placed here, near *U. pliciferus*, in the subgenus *Elliptio*, *U. rubicundus* differs from all its allies in the large size and thickness of the shell and in the stout teeth.

Unio rugoso-sulcatus, Lea, Obs. Gen. *Unio*, xii. p. 26, t. 34. fig. 81 (1866), supposed to be from Central America, is rather near the present species, but it is a little more triangular, without prominences and plaits, and has the hinder part distinctly biangulated.

44. **Unio pliciferus.**

Unio pliciferus, Lea, Trans. Am. Phil. Soc. vi. p. 61, t. 17. fig. 53 (1836)[1]; Obs. Gen. *Unio*, ii. p. 61, t. 17. fig. 53[2]; Hanley, Cat. Rec. Bivalv. p. 176, t. 20. fig. 32[3]; Küster, in Martini & Chemnitz, Syst. Conch.-Cab., ed. 2, *Unio*, p. 142, t. 42. fig. 1[4]; Chenu, Manuel de Conch. ii. p. 142, fig. 702[5]; Sowerby, in Reeve's Conch. Icon. xvi., *Unio*, t. 75. fig. 387[6]; Fisch. & Crosse, Miss. Scient. Mex., Moll. ii. p. 580, t. 65. fig. 2, and t. 70. figg. 2, 2 *a*[7].

Unio plexus, Conrad, Monogr. Fam. Unionidæ, p. 89, t. 49. figg. 1, 2 (1838) [8].

Unio coloratus (Charpentier), v. Mart. Malak. Blätt. xii. p. 59 (1865) [9]; Fisch. & Crosse, loc. cit. p. 599 [10] (part.).

Thick-shelled, elliptical, rather swollen; outside unicolorous deep black, with few and not very conspicuous plaits on the hinder slope, most of them directed obliquely backward, those in the middle of the shell sometimes directed vertically downward; inside purple, passing into orange.

a. Long. 64; alt. vert. 34, alæ 35, diam. 26 millim. Vertices in $\frac{2}{7}$ long.
b. „ 56; „ $33\frac{1}{2}$, „ $31\frac{1}{2}$, „ 24 „ „ $\frac{1}{4}$ „
c. „ 51; „ 29, „ $26\frac{1}{2}$, „ 17 „ „ $\frac{1}{3}$ „
d. „ 50; „ 29, „ $27\frac{1}{2}$, „ 22 „ „ $\frac{1}{3}$ „
e. „ $44\frac{1}{2}$; „ $25\frac{1}{2}$, „ $26\frac{1}{2}$, „ $20\frac{1}{2}$ „ „ $\frac{1}{3}$ „
f. „ 42; „ 24, „ 24, „ 17 „ „ $\frac{1}{3}$ „
g. „ $42\frac{1}{2}$; „ $23\frac{1}{2}$, „ 24, „ $17\frac{1}{2}$ „ „ $\frac{1}{3}$ „

a. An unusually large specimen collected by H. Strebel; *b.* Uhde's example [9]; *c, d.* Specimens collected by H. H. Smith; *e, f, g,* by Strebel. All from the Rio Medellin.

Hab. E. Mexico: Rio Medellin, near Vera Cruz (*Uhde* [9], *Strebel*, *H. H. Smith*); Rio Jamapa, near Vera Cruz (*Strebel*, *in Mus. Hamburg*); Mexico, without nearer indication of locality (*Dr. Burrough* [12]).

I have given the measurements of several specimens from the Rio Medellin, in order to show the range of variation in shape, the height of the summits in some of them being a little more, in others a little less, than that of the wing, and the proportion of the height to the length varying also considerably.

Lea [12] gives the colour of the inside as nacre-purple, rarely white [7], and in his figure it is white. Out of fifty-six examples before me, two only, both also from the Medellin river, are white inside, one of them perhaps bleached, the other fresh. The purple is not of the same tint as in *U. aztecorum* and others, but more lustrous and somewhat verging into orange.

Burrough's specimens also were probably from the Medellin river, as this locality is expressly mentioned by him for the var. *carbonarius*.

Var. *minor*. (Tab. XXXIX. figg. 4, 4 *a*.)

Unio pliciferus, var. *minor*, Fisch. & Cross, loc. cit. p. 581, t. 69. fig. 4 [11].

Only differing by its smaller size.

h. Long. 33; alt. vert. $21\frac{1}{2}$, alæ 22, diam. 16 millim. Vertices in $\frac{2}{7}$ long.
i. „ 35; „ $19\frac{1}{2}$, „ 21, „ 12 „ „ $\frac{1}{3}$ „
j. „ $33\frac{1}{2}$; „ 20, „ 20, „ 14 „ „ $\frac{1}{3}$ „
k. „ 33; „ 17, „ 17, „ $12\frac{1}{2}$ „ „ $\frac{1}{3}$ „
l. „ 32; „ 16, „ 18, „ 12 „ „ $\frac{1}{3}$ „
m. „ 28; „ 14, „ 14, „ 10 „ „ $\frac{1}{3}$ „

h. Fischer and Crosse's figure [11]; *i.* Specimen received from Anthony; *j, k,* and *l.* Examples collected by H. Strebel; *m.* Specimen in the late Dunker's collection, now in the Berlin Museum—notwithstanding its small size, probably full-grown, as the shell is comparatively solid and the summits much worn.

Hab. E. Mexico: with the typical form (*Fischer & Crosse* [11]); Rio Medellin (*Anthony*, *H. Strebel*).

Var. *carbonarius.*

Unio carbonarius, Lea, Trans. Am. Phil. Soc. vi. p. 37, t. 11. fig. 32 (1836) [12]; Obs. Gen. *Unio,* ii. p. 37, t. 11. fig. 32 [13]; Synopsis of Unionidæ, ed. 4, p. 31 (1870) [14]; Hanley, Cat. Rec. Bivalv. p. 184, t. 22. fig. 10, and t. 23. fig. 12 [15].

Ventral margin sinuated.

Hab. E. Mexico: Rio Medellin (*Dr. Burrough* [12 13]).

Lea [12 13] mentions no plaits in the description, but as his type was much worn over a great part of the surface, they may have been present in a younger state and disappeared afterwards by external injury: he says that his specimen is probably very old.

45. **Unio ravistellus.** (Tab. XXXVIII. figg. 2–6 *a*.)

Unio ravistellus, Morelet, Test. Noviss. i. p. 29 (1849) [1]; Küster, in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, *Unio,* p. 145, t. 42. fig. 6 [2]; Sowerby, in Reeve's Conch. Icon. xvi., *Unio,* t. 72. fig. 366 [3]; Fisch. & Crosse, Miss. Scient. Mex., Moll. ii. p. 609, t. 61. figg. 4, 5, 5 *a* [4].

Of small size, rather thin, kidney-shaped, dorsal margin in the hinder part arcuated, ventral margin more or less sinuated; usually much eroded, chiefly behind the summits in larger patches. Cardinal teeth small, triangular, furrowed. Inside of the shell lead-coloured.

a. Long. 38; alt. vert. 22, alæ ?, diam. 12 millim. Vertices in $\frac{1}{3}$ long.
b. „ 39; „ 21, „ $19\frac{1}{2}$, „ $13\frac{1}{2}$ „ „ $\frac{1}{3}$ „
c. „ 40; „ 17, „ 19, „ ? „ „ $\frac{1}{3}$ „
d. „ 35; „ $18\frac{1}{2}$, „ 18, „ ? „ „ $\frac{1}{3}$ „

a. Measurements given by Morelet [1]; *b*, *d*. Figures given by Fischer and Crosse [4]; *c*, by Küster [2].

Hab. E. Guatemala: Lake of Yzabal (*Morelet* [1 4]); Guatemala, without nearer indication of locality (*Charpentier* [2]).

The specific name *ravistellus* is derived from the Latin *ravus*, grey: this term was probably used to describe the colour of the inside of the shell, the outside being dark brown, as in most other species of the genus.

Var. *majusculus.*

Of larger size; the summits somewhat more advanced.
a. Long. 59; alt. vert. 27, alæ 28, diam. $17\frac{1}{2}$ millim. Vertices in $\frac{2}{7}$ long.
b. „ 58; „ 26, „ 27, „ $17\frac{1}{2}$ „ „ $\frac{2}{7}$ „
c. „ 55; „ 26, „ 27, „ 20 „ „ $\frac{2}{7}$ „

Hab. E. Guatemala: Lake of Yzabal (*Stoll*).

The dimensions given show that this form varies considerably in the general outlines.

Var. *veræpacis.* (Tab. XXXVIII. figg. 1, 1 *a*.)

Unio veræpacis, Tristram, P. Z. S. 1863, p. 414 [5].

Unio vellicatus, Sowerby, in Reeve's Conch. Icon. xvi., *Unio,* t. 22. fig. 103 (1865) [6].

Of smaller size, the summits more advanced, the hinder part bent downward; inside purplish-brown.
a. Long. 43; alt. vert. 19, alæ 20, diam. 15 millim. Vertices in $\frac{1}{4}$ long.
b. „ 45; „ 22, „ 23, „ ? „ „ $\frac{1}{4}$ „

a. Tristram's type; *b*. Sowerby's figure.

Hab. E. Guatemala: Vera Paz (*Salvin* [5]); Panzos (*Conradt, in Mus. Berol.*).

46. **Unio opacatus.**

Unio opacatus, Cross & Fisch. Journ. de Conch. xli. p. 295 (1893) [1]; Miss. Scient. Mex., Moll. ii. p. 592, t. 66. figg. 1, 1 *a* [2].

Hab. Mexico (*Sallé* [1 2]).

Perhaps only a somewhat shorter variety of *U. mexicanus*.

47. **Unio mexicanus.**

Unio mexicanus, Philippi, Zeitschr. f. Malak. iv. p. 75 (1847) [1]; Abbild. neuer Conch. iii. p. 36, t. 6. fig. 3 [2]; Küster, in Martini & Chemnitz, Syst. Conch.-Cat. ed. 2, *Unio*, p. 285, t. 95. fig. 7 (copy from Philippi) [3].

Elliptic, angularly produced behind, smooth, brown; inside purple.

Hab. Mexico (*Liebmann* * [1–3]).

It is strange that this species has not been met with by later travellers.

48. **Unio sallei.**

Unio sallei, Crosse & Fisch. Journ. de Conch. xli. p. 179 (1893) [1]; Miss. Scient. Mex., Moll. ii. p. 619, t. 68. figg. 3, 3 *a* [2].

Differs from *U. mexicanus*, Phil., in having the part before the summits shorter and the hinder extremity more rounded.

Hab. Mexico (*Sallé* [1 2]).

Type of the section *Pachynaias* of Crosse and Fischer.

Var. *grossus*, n. (Tab. XXXIV. figg. 2, 2 *a*, *b*.)

Shorter, and therefore comparatively higher, than the typical form of *U. sallei*, very thick, fore side regularly rounded, dorsal margin descending from the summits in a nearly straight, slightly convex line to the hinder extremity; a very obtuse ridge descends from the summits to the hinder end of the ventral margin, and forms here a slight prominence; ventral margin much ascending before, slightly convex at the middle, subsinuated behind. Inside white. Cardinal teeth rather strong.

Long. 62; alt. vert. 44, alæ 38, diam. 30 millim. Vertices in $\frac{1}{3}$ long.

Hab. N. Guatemala: Rio Salinas (*Stoll*).

49. **Unio medellinus.** (Tab. XXXIX. figg. 7, 7 *a*, *b*.)

? *Unio purpuriatus*, Say, New Harmony Disseminator of Useful Knowledge, 1831, p. 6 [1]; Conrad, Proc. Acad. Phil. vi. p. 255 [2] (nec *U. purpuratus*, Lam., 1819).

Unio medellinus, Lea, Trans. Am. Phil. Soc. vi. p. 39, t. 12. fig. 34 (1838) [3]; Obs. Gen. *Unio*, ii. p. 39, t. 12. fig. 34 [4]; Hanley, Cat. Rec. Bivalv. p. 193, t. 23. fig. 8 (male) [5]; Chenu, Illustr. Conch., *Unio*, t. 17. fig. 6 [6]; Küster, in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, *Unio*, p. 162, t. 46. fig. 5 [7]; Sowerby, in Reeve's Conch. Icon. xvi., *Unio*, t. 33. fig. 171 [8]; Fisch. & Crosse, Miss. Scient. Mex., Moll. ii. p. 603 [9].

? *Unio veracruzensis*, Lea, Proc. Acad. Phil. 1868, p. 150 [10]; Obs. Gen. *Unio*, xii. p. 80, t. 52. fig. 133 [11].

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* See footnote, *anteà*, p. 500.

Oval, rather thin, and compressed, yellowish-green, with darker green rays; ventral margin slightly sinuated in the full-grown state, straight or even a little convex in the young. Cardinal teeth rather compressed, short. Inside shining, whitish, with a yellowish or rosy hue in the centre; in some specimens more rose-coloured.

a. Long. 57; alt. vert. 26, alæ 32, diam. 21 millim. Vertices in $\frac{2}{7}$ long.
b. „ 55; „ 28, „ 31, „ 21 „ „ $\frac{1}{3}$ „
c. „ 48; „ 26, „ 27, „ 17 „ „ $\frac{1}{3}$ „
d. „ 46; „ 23, „ 24, „ 15 „ „ $\frac{1}{3}$ „
e. „ 41; „ 23, „ 25, „ 14 „ „ $\frac{1}{3}$ „
f. „ 37; „ 20, „ 22, „ 13 „ „ $\frac{1}{3}$ „

a. From Lea's figure; *d.* From Küster's figure; *b*, *c*, *e*, and *f*. Specimens collected by H. H. Smith, *e* and *f*, probably not full-grown.

Hab. E. Mexico: Rio Medellin, near Vera Cruz (*Dr. Burrough* [3–5], *H. H. Smith*); near Vera Cruz (*Sturm* [7], *Bennett* [1 2], *Strebel* [9 10]).

In old specimens the summits are somewhat more depressed and eroded, and the difference between the height of the summits and that of the wing greater, as in Lea's figure (*a*): in full-grown, but less eroded, examples this difference is less marked (*b*, *c*, *d*); in young specimens (fig. 7) it is again considerable (*e*, *f*), these in the Unionidæ generally having the wing comparatively higher than full-grown ones.

Hanley's figure [5] is too elongate, probably an inexact reduced copy of that given by Lea.

U. veracruzensis, Lea, is perhaps the young state of *U. medellinus*; it often happens in this genus, and especially in the present species, that the ventral margin is more convex in young specimens than in old ones.

U. amœnus, Lea (Obs. Gen. *Unio*, iii. p. 39, t. 6. fig. 12), from Texas, is very near *U. medellinus*.

50. **Unio æruginosus.**

Unio æruginosus, Morelet, Test. Noviss. i. p. 29 (1849) [1]; Fisch. & Crosse, Miss. Scient. Mex., Moll. ii. p. 576, t. 62. figg. 2, 2 *a*, *b* [2].

Hab. S.E. Mexico: Rio Michol, at Palenque, State of Chiapas (*Morelet* [1 2]).

51. **Unio radiatulus,** sp. n. (Tab. XXXIX. figg. 8, 8 *a*, *b*.)

Shell elliptic, rather thick, concentrically striate, striæ flat, but rather broad; yellowish-brown, with several (6) dark green rays; fore part shortly rounded; dorsal margin behind the summits at first nearly horizontal, then convexly descending; hinder extremity obtusely beaked and angulated, with a very obtuse ridge descending from the summits to the hinder end of the dorsal margin; ventral margin straight in the middle, little ascending before and behind. Summits scarcely prominent, in $\frac{2}{7}$ of the length. Inside somewhat dull, pale greyish or livid. Cardinal teeth small, somewhat triangular and furrowed; lateral lamellæ scarcely arcuated.

a. Long. 44; alt. vert. $24\frac{1}{2}$, alæ $23\frac{1}{2}$, diam. 16 millim. Vertices in $\frac{2}{7}$ long.
b. „ $40\frac{1}{2}$; „ 23, 20, „ $13\frac{1}{2}$ „ „ $\frac{1}{3}$ „

Hab. W. Guatemala: Rio Naranjo, a confluent of the Rio Michatoya, at the station Naranjo, and Paso Antonio in the lower part of the Rio Michatoya (*Stoll*).

Near *U. æruginosus*, but differing from it in having the summits less advanced (in one-third of the length in *U. radiatulus*, in one-fourth in *U. æruginosus*), the cardinal teeth comparatively stronger, the ventral margin slightly arcuate in its whole length, and the hinder extremity somewhat more produced below. From *U. yzabalensis* it is distinct by the comparatively lower shell, the smaller cardinal teeth, and the absence of numerous and concentric ridges on the outside.

The figure of *U. calamitarum*, Fisch. & Crosse (Miss. Scient. Mex., Moll. t. 64. fig. 5), resembles this species in outline, but differs from it in the form of the hinder end.

52. **Unio rowelli.**

Unio rowelli, Lea, Proc. Acad. Phil. 1859, p. 153 [1]; Journ. Acad. Phil. (2) iv. p. 256, t. 40. fig. 136 [2]; Obs. Gen. *Unio*, vii. p. 74, t. 40. fig. 136 [3], and xiii. p. 71 (animal) [4]; Tate, Am. Journ. of Conch. v. p. 160 (1870) [5].

Oval, a little produced before, attenuated behind, ventral margin much arcuated, with feeble triangular cardinal teeth.

Long. 43; alt. vert. 25, alæ 23, diam. 16 millim. Vertices in $\frac{1}{3}$ long.

Hab. NICARAGUA: Rio Malacatoya and Rio Estar (*Tate* [5]).

N. PANAMA: Rio Chagres (*Rowell* [1 3]).

The summits are said to have undulate sculpture.

53. **Unio guatemalanus,** sp. n. (Tab. XXXVIII. figg. 7–8 *a*.)

Testa ovata, sat compressa, striis concentricis distinctis, intermixtis crassioribus sculpta, flavido-fusca, antice subproducta, supra et infra subæqualiter arcuata, postice subrostrata, margine dorsali posteriore declivi, rostro obtuso, subtruncato, margine ventrali leviter arcuato, antice magis quam postice ascendente; facies interna pallide livida; dentes cardinales compressi, obliqui, crenati.

a. Long. $57\frac{1}{2}$; alt. vert. 32, alæ 30, diam. $17\frac{1}{2}$ millim. Vertices in $\frac{1}{3}$ long.
b. „ $56\frac{1}{2}$; „ 30, „ 28, „ 19 „ „ $\frac{3}{8}$ „

Hab. W. GUATEMALA: Paso Antonio, Rio Michatoya (*Stoll*).

Two perfect specimens of this species are before me: one of them (*b*) agrees rather well in its general features with *U. rowelli*, Lea, except in the fore part of the shell; but the other (*a*) is remarkably higher, more compressed, more broadly rounded before and behind. Some single valves were also found at Paso Antonio, and these connect the two forms.

There is no trace of peculiar sculpture on the summits.

X. UNIOMERUS, Conrad.

54. **Unio manubius.**

Unio manubius, A. Gould, Proc. Bost. Soc. Nat. Hist. v. p. 229 (1855) [1]; Otia Conch. p. 218 [2]; Lea, Obs. Gen. *Unio*, vi. p. 53 [3]; Synops. Fam. Unionidæ, ed. 4, p. 54 (1870) [4]; Stearns, Proc. U. S. Nat. Mus. xiv. p. 105 (1891) [5]; Fisch. & Crosse, Miss. Scient. Mex., Moll. ii. p. 591 [6].

Hab. N. CENTRAL MEXICO: State of Chihuahua, sixty miles from Camp Ringgold (*Webb* [1]).

Also found in Texas (*Lea* [3]).

According to Stearns [5], who has examined the original specimen, *U. manubius* is one of the varieties of the North-American *U. camptodon*, Say.

55. **Unio explicatus.**

Unio explicatus, Morelet, Test. Noviss. i. p. 28 (1841) [1]; Fisch. & Crosse, Miss. Scient. Mex., Moll. ii. p. 594, t. 61. fig. 1 [2].

Unio testudineus, Sowerby, in Reeve's Conch. Icon. xvi., *Unio*, t. 22. fig. 101 [3] (nec Morelet).

Hab. S.E. Mexico: Rio Usumacinta, near Balancan, State of Tabasco (*Morelet* [1 2]).

XI. Metaptera, Raf.

56. **Unio paludosus.**

? *Unio largillierti*, Philippi, Zeitschr. f. Malak. iv. p. 94 (1847) [1].

Unio paludosus, Morelet, Test. Noviss. i. p. 30 (1849) [2]; Fisch. & Crosse, Miss. Scient. Mex., Moll. ii. p. 559, t. 59. fig. 3 [3].

Compressed, with a low wing and a distinct angular line behind the summits.

Hab. Yucatan: marshes near San Gerónimo (*Morelet* [2 3]); Yucatan (*Largilliert* [1]).

Var. *planivalvis*.

Unio planivalvis, Morelet, Test. Noviss. ii. p. 24 (1851) [4]; Fisch. & Crosse, Miss. Scient. Mex., Moll. ii. p. 560, t. 59. fig. 2 [5].

Differs only in having the hinder part more prolonged.

Hab. N. Guatemala: marshes near the Rio Usumacinta (*Morelet* [4 5]).

57. **Unio scutulatus.**

Unio scutulatus, Morelet, Test. Noviss. i. p. 30 (1849) [1]; Fisch. & Crosse, Miss. Scient. Mex., Moll. ii. p. 561, t. 59. figg. 4–6, t. 67. fig. 6 [2].

Compressed, with radiated sculpture and a very low wing-like prominence behind the summits.

Hab. Yucatan: marshes near San Gerónimo, with the preceding (*Morelet* [1 2]).

Fischer and Crosse [2] distinguish two varieties—*obliteratus*, fig. 5, with very feeble, almost evanescent sculpture, and *secabilis*, fig. 6, with the sculpture of the hinder part considerably stronger, both from the same locality.

58. **Unio delphinulus.**

Unio delphinulus, Morelet, Test. Noviss. i. p. 31 (1849) [1]; Hanley, Cat. Rec. Bivalv. p. 381, t. 23. fig. 60 [2]; Sowerby, in Reeve's Conch. Icon. xvi., *Unio*, t. 43. fig. 237 [3]; Fisch. & Crosse, Miss. Scient. Mex., Moll. ii. p. 557, t. 63. figg. 2, 2 *a*, *b* [4].

Hab. N. Guatemala: marshes of the Rio Usumacinta (*Morelet* [1 4]); Lake of Peten (*Morelet* [1 4]).

The localities "Tabasco," in Paetel's Catalogue, and "Yucatan," given by Hanley [2],

are probably only vague generalizations of the places mentioned by Morelet. According to Fischer and Crosse [4], Bocourt has also found this species, but they do not say in what locality.

U. delphinulus is easily recognizable among the Central-American forms by the well-developed conspicuous wing, in which the two valves are grown together, so that they cannot be separated without breaking, and the opening and closing of the shell is only possible by its elasticity. This is the character of the artificial genus *Symphynota*, Lea, and it is also the case in a Malayan species, *Unio delphinus*, Gruner. The nearest allies to *U. delphinulus* are, however, I think, the North-American *U. inflatus*, Lea, and *U. alatus*, Say, of the subgenus *Metaptera*, Raf.; these agree with *U. delphinulus* in the form of the wing, as well as in that of the whole shell, especially of its hinder end, and in the general coloration, but the teeth are comparatively somewhat stronger in the North-American forms.

Dubious or insufficiently known Species.

Unio largillierti.

Unio largillierti, Philippi, Zeitschr. f. Malak. iv. p. 94 (1847) [1].

Hab. YUCATAN (*Largilliert* [1]).

This species seems not to have been found again—that is, if it is really different from *U. paludosus*, Morel.*.

Unio tamaulipanus.

Unio tamaulipanus, Conrad, Proc. Acad. Phil. vii. p. 256 (1855) [1]; Lea, Synops. Fam. Unionidæ, p. 65 (1870) [2].

Unio tamaulipasensis, Fisch. & Crosse, Miss. Scient. Mex., Moll. ii. p. 621 [3].

Hab. N.E. MEXICO: Rio San Juan, State of Tamaulipas (*Conrad* [1–3]).

Insufficiently described, no measurements or figure given; it is said to be near *U. niger*, Raf. (*incrassatus*, Lea).

* According to Philippi's description (it is not figured), there are in the posterior part two furrows descending from the summits, while in *U. paludosus*, according to Fischer and Cosse, there is a descending keel, oblique and obtuse: these definitions may have the same meaning, Philippi's furrows being the depressions which border the obtuse elevated line. Further, the last-mentioned author says that the wing is rectangular, forming a right angle above (superius): if he means that the upper edge forms a right angle with the hinder edge, this may apply somewhat approximately also to *U. paludosus*. Moreover, he mentions a small true cardinal tooth behind the anterior lamellar ones, and the same is stated also by Fischer and Crosse. It is to be regretted that Philippi gave no measurements, but as he says "pernobilis species," and compares it with *Dipsas* (*Cristaria*) *plicata*, we may presume that his shell was of rather large size; on the other hand, he states that he had only a young specimen from Largilliert.

Unio mitchelli.

Unio mitchelli, Simpson, Dall, Proc. U. S. Nat. Mus. xviii. p. 5 (1895) [1].

Hab. N.W. Mexico: Rio Salado, near Nuevo Leon (*Dr. Mearns* [1]). Also in Texas [1].

"Probably groups with *U. rowelli* and *U. scamnatus*."

Unio saladoensis.

Unio saladoensis, Lea, Proc. Acad. Phil. 1860, p. 305 [1]; Journ. Acad. Phil. (2) iv. p. 370, t. 65. fig. 195 [2]; Obs. Gen. *Unio*, viii. p. 50, t. 15. fig. 195 [3].

Rounded on both sides, yellowish-green, with many darker rays; cardinal teeth lamellar. Long. 30; alt. vert. 18, alæ 22, diam. 13 millim. Vertices in $\frac{1}{3}$ long.

Hab. N.E. Mexico: Rio Salado, State of Nuevo Leon (*Berlandier* [1–3]).

Has much the aspect of a young shell.

Unio petrinus.

Unio petrinus, A. Gould, Proc. Bost. Soc. Nat. Hist. v. p. 228 (1855) [1]; Lea, Obs. Gen. *Unio*, viii. pp. 41, 54, 104 [2]; Synops. Fam. Unionidæ, ed. 4, p. 100 (1870) [3].

Hab. ? Mexico.

The only *Unio* of "subrotundate form" enumerated by Lea [3] among the species from Mexico and Central America, with the indication "Llanos riv., Mex."; but A. Gould [1] says expressly "Llanos river, Texas."

Unio scamnatus.

Unio scamnatus, Morelet, Test. Noviss. i. p. 30 [1]; Lea, Obs. Gen. *Unio*, vii. p. 77 [2].

See *anteà*, p. 507.

Unio rugoso-sulcatus.

Unio rugososulcatus, Lea, Proc. Acad. Phil. 1866, p. 33 [1]; Journ. Acad. Phil. (2) vi. p. 266, t. 34. fig. 81 [2]; Obs. Gen. *Unio*, xii. p. 26, t. 34. fig. 81 [3].

Locality unknown. Lea supposes it to be from Central America and compares the species with his *U. newcombianus*, but it is much longer. As regards its resemblance to *U. rubicundus*, see *anteà*, p. 514.

Unio metallicus.

Unio metallicus, Say, New Harmony Disseminator of Useful Knowledge, 1831, p. 6 [1]; Lea, Synops. Fam. Unionidæ, ed. 4, p. 61 (1870) [2]; Fisch. & Crosse, Miss. Scient. Mex., Moll. ii. pp. 615, 616 [3].

Hab. Mexico, perhaps from the Lake of Chalco (*Maclave* [1 3]).

Lea [2] and Fischer and Crosse [3] refer this species to *U. cuprinus*, Lea, but, to judge from Say's description, I am not at all satisfied with this identification. Perhaps it

may be nearer to *U. aztecorum*, Phil. If it is, indeed, from the Lake of Chalco, it is the only species of *Unio* found in the waters on the central plateau of Mexico which do not drain to the Pacific or Atlantic.

Unio sp., aff. **parvo.**

Unio (*Lampsilis*) sp., an *parvus* ?, v. Mart. Malak. Blätt. xii. p. 60 (1865).

In the Berlin Museum there is a broken example of a little *Unio* nearly allied to *U.* (*Micromya*) *parvus*, Barn., with a considerable swelling in the hinder part of the shell. It was given by C. Uhde, with the label "Vera Cruz, River Medellin." As the specimen is too imperfect to be figured, and a confusion of the labels during the transport of the collection from Heidelberg to Berlin may have taken place, I refrain from describing it at present.

ANODONTA.

Anodontites, Bruguière, Choise de Mémoires sur divers objets d'Hist. Nat. (1792); Cuvier (1798); Poiret (1801).

Anodonta, Lamarck, Prodrome d'une Classification de Coquilles (1799); Draparnaud (1801); Cuvier (1817), &c.

Resembling the genus *Unio* in most respects, but with the hinge simple, without teeth; shell generally rather thin. Living chiefly in quiet stagnant water.

For a more complete account of the history and of the systematic and anatomical characters of this genus, see Fischer and Crosse (Miss. Scient. Mex., Moll. ii. pp. 509 *et seq.*). As in *Unio*, the sexes are mostly separated, and the female individual sometimes recognizable by the greater convexity of the shell, due to the development of the eggs within the gills *.

Geographical distribution:—Widely spread on all the continents, but scarcely represented in Tropical Africa. Northwards, it extends in Europe and America somewhat further than *Unio*—*A. frigida*, Drouet, in Sweden, beyond 62° N. lat.; another species in the territory of Ob and Yenisei, up to 62°–63°; *A. kennicotti* and *A. simpsoniana*, Lea, in the Great Slave Lake, beyond 60°; *A. yukonensis*, Lea, about 60°–65°,—but not so far as the smaller freshwater snails (Limnæidæ), nor, in Europe, as *Margaritana margaritifera*, L. In Switzerland and the Tyrol it is found in small mountain-lakes, ascending somewhat higher than the genus *Unio*. On the central plateau of Mexico we know as yet three localities only for *Anodonta*—the Lake of Chalco (2276 metr.), the environs of the city of Mexico (2270 metr.), and the Lake of Chapala (1700 metr.).

Fischer and Crosse have grouped the Mexican and Central-American forms of this genus under five sections, giving to each of them a new subgeneric name, without regard to the species from other parts of the world. They do not mention the shape of the

* Further observations on the development of the egg in the Mexican and Central-American species are much desired.

sinulus, a notch in the hinge-line at the hinder end of the ligament: this, I think, is an important character, the sinulus being deep, triangular, with a sharp point, and vertically as deep as broad, in the South-American species, and, on the contrary, shallow and rounded below in the North-American and European forms. H. v. Ihering has pointed out that in the South-American *Anodontæ* the eggs are hatched within the inner gills of the mother, whereas in the North-American and European species they are hatched within the outer gills: he has also noted that the form of the larva ("lasidium") of the South-American *Anodontæ* is different from that of the European and North-American forms ("glochidium") (see 'Archiv für Naturgeschichte,' 1893, pp. 45–140). We may therefore assume that the above-mentioned variation in the form of the sinulus coincides sufficiently well with the difference in the development to authorize a primary subdivision in this genus; and this is especially important for our purpose, as in Central America the Nearctic and Neotropical forms intermingle. I propose, therefore, the following subdivision:—

A. Sinulus shallow, rounded.

[Palæarctic, Nearctic, and Central-American species: none on the mainland of South America.]

I. Anodonta, s. str.—Summits little prominent or nearly plane, dorsal margin slightly arcuated, not distinctly angulated at its fore end; shell moderately convex. Includes the greater part of the North-American and Palæarctic species. Fischer and Crosse divide the Mexican and Central-American representatives of this section into two subgenera:—

(a) *Brachyanodon*, Fischer & Crosse (1893).—Shell rather short, dorsal margin ascending posteriorly: *A. coarctata, richardsoni, exilior, chalcoensis, montezuma.*

(b) *Mesanodon*, Fischer & Crosse (1893).—Shell oval, dorsal margin less ascending posteriorly: *A. lurulenta, henryana, tehuantepecensis.*

This separation, I fear, can scarcely be maintained with regard to the numerous North-American, or even the European, species, which, apparently, are not subgenerically distinct from the Mexican ones.

II. Gonidea, Lea (1870).—Elongated, hinder part of the shell obliquely keeled: *A. angulata*, Lea, California.

III. Patularia, Swainson, Treat. Malac. p. 381 (1840)*: *Pteranodon*, P. Fischer, Manuel de Conch. p. 1003 (1886); *Pyganodon*, Fischer & Crosse (1893).—Summits very prominent, swollen; shell very convex; dorsal margin distinctly angulated at its fore end, often also at its hinder end. Sinulus somewhat deeper, but always rounded. Ventral margin arcuated. Includes *A. woodiana* and *A. magnifica*, Lea, from China; *A. vescoiana*, Bourg., from the Euphrates River; *A. grandis*, Say, *A. gibbosa*, Say, and *A. stewartiana*, Lea, from Eastern North America; *A. glauca*, from N.W. Mexico; *A. globosa, tabascensis, nopalatensis*, and *grijalvæ*, from E. and S.E. Mexico.

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* Swainson quotes his *A. ovata* and *A. rotundata* as typical species of *Patularia*: the latter is without doubt the Chinese *A. magnifica*; the former either *A. glauca*, Val., or a nearly allied form. Fischer's subgen. *Pteranodon* is proposed for the Chinese species.

B. Sinulus deep, triangular, pointed.

[Neotropical species.]

IV. Scolianodon, n.—Oval, summits somewhat unequal. Only known from the Lake of Nicaragua. —*A. inæquivalvis, lenticularis, granadensis.*

V. Euryanodon, Fischer & Crosse (1893).—Elongated, dorsal margin not ascending posteriorly: *A. bambusearum,* Morelet, and probably also *A. cylindracea,* Lea, from E. and S.E. Mexico; *A. amazonensis,* Lea, from the Upper Amazons.

Anodonta solidula, Hupé, and some nearly allied species are not far from this group, and lead to *Lamproscapha,* Swains. (1840), type *A. ensiformis,* Spix.

VI. Glabaris, Gray, P. Z. S. 1847, p. 206; Conrad (1857).—Oblong, dorsal margin forming a straight line before and behind the summits, subangulated at its fore and hinder ends. Inside very iridescent: *A. nicaraguæ* and *jewetti,* from Central America; *A. exotica,* Lam., *A. anserina,* Spix, *A. forbesiana,* Lea, &c., from South America.

VII. Pseudoleila, Fischer & Crosse (1893).—Near the preceding, but distinct by the remarkable gaping of the underside of the fore extremity: *A. ciconia,* from N.W. Mexico.

Differs from the South-American *Leila,* Gray, in the want of a pallial sinus.

VIII. Pachyanodon, n.: "Anodontæ latomarginatæ," v. Martens, in Malak. Blätt. 1868, p. 211; Die dickschaligen südamerikanischen Anodonten, Clessin, in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, *Anodonta,* p. 77.—Rounded, solid; the dull lustreless zone inside the ventral and posterior margins very broad: *A. latomarginata,* Lea, and other species from South America; *A. luteola,* from the Isthmus of Darien.

IX. Styganodon, n.—Shell more or less reniform, inside more or less dark and dull, with a broad lustreless marginal zone as in *Pachyanodon*: type *A. tenebricosa,* Lea, from South America. Not yet known from Central America.

Anodonta, sensu strictiore.

1. Anodonta coarctata. (Tab. XL. figg. 1–7.)

Anodonta coarctata, Anton, Verz. d. Conch. p. 16. no. 583 (1839) [1]; Küster, in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, *Anodonta,* p. 34, t. 8. fig. 2 [2]; Fisch. & Crosse, Miss. Scient. Mex., Moll. ii. p. 519 [3] (nec *A. coarctata,* Potiez et Michaud, Galerie Moll. 1844).

Anodonta chapalensis, Crosse & Fisch. Journ. de Conch. xl. p. 295 (1892) [4]; Miss. Scient. Mex., Moll. ii. p. 518, t. 64. figg. 8–11 [5].

Oval, shortly rounded before, elevated and produced behind, moderately convex, olivaceous-greenish, with blackish lines of growth; ventral margin moderately arcuated, ascending more distinctly before than behind; dorsal margin ascending behind the summits to as far as the notch (sinulus) of the ligament and there forming an obtuse angle with the descending posterior margin, which becomes almost vertically truncated in its lower half. Inside dull bluish, in the centre pale greyish-violet or dull orange, not very iridescent; the dull marginal zone rather narrow. Summits much worn.

a.	Long. 68;	alt. vert. 37,	alæ 39,	diam. $23\frac{1}{2}$	millim.	Vertices in $\frac{1}{4}$	long.
b.	„ $62\frac{1}{2}$;	„ $35\frac{1}{2}$,	„ 41,	„ 22	„	„ $\frac{3}{10}$	„
c.	„ 62;	„ $33\frac{1}{2}$,	„ 37,	„ $21\frac{1}{2}$	„	„ $\frac{1}{4}$	„
d.	„ 59;	„ 34,	„ 38,	„ 23	„	„ $\frac{2}{7}$	„
e.	„ 51;	„ 31,	„ 34,	„ 15	„	„ $\frac{2}{7}$	„
f.	„ 51;	„ $28\frac{1}{2}$,	„ 35,	„ $16\frac{1}{2}$	„	„ $\frac{2}{7}$	„

Comparative Table of the Species of *Anodonta*.

Nomen.	Forma.	Sculptura.	Coloratio externa.	Vertices in long.	Long.	Alt. vert.	Alt. alæ.	Diam.	Patria.
Anodonta, sensu strict. [Brachyanodon, *F. & Cr.*]					mm.	mm.	mm.	mm.	
coarctata, *Anton*	ovata, subalata, rostrato-truncata, antice breviter rotundata, marg. ventr. subrecto, juv. arcuato.	opaca, concentr. leviter striata.	olivaceo-viridis, obscurius zonata.	plani, $\frac{1}{4}$.	59–68	34–37	37–41	22–23	Central Mexico.
richardsoni, *v. Mart.*	subtrigono-ovata, marg. dors. postico oblique descendente, postice altior, marg. ventr. modice arcuato.	opaca, concentr. inæqualiter et grossiuscule striata.	grisea, unicolor.	subplani, $\frac{1}{3}$.	59	36	41	23	N.W. Mexico.
exilior, *Lea*	ovata, subalata, rostrata, ant. rotundata.	nitida, concentr. leviter striata.	obscure viridis, nigro-zonata.	plani, $\frac{2}{7}$.	50–69	28–43	32–42$\frac{1}{2}$	16–23	E. Mexico.
montezuma, *Lea*	obovata, ant. et post. rotundata, marg. ventr. leviter convexo.	concentr. rugosa.	viridi-flava.	prominuli, $\frac{2}{7}$.	39	25	24$\frac{1}{2}$	15	?
chalcoensis, *Cr. & F.*	obovata, utrinque rotundata, marg. ventr. arcuato.	opaca, conc. striata, postice sublamellosa.	olivacea.	plani, $\frac{1}{4}$.	52	29	35	21$\frac{1}{2}$	Central Mexico.
[Mesanodon, *F. & Cr.*]									
lurulenta, *Morel.*	ovato-oblonga, antice rotundate producta, post. subtruncata.	antice nitida, postice sublamellosa.	viridis.	prominuli, $\frac{1}{3}$–$\frac{2}{7}$.	40–54	22–29$\frac{1}{2}$	23–30$\frac{1}{2}$	15$\frac{1}{2}$–19	E. Mexico, Yucatan, ? N. Guatemala.
henryana, *Lea*	oblongo-ovata, tumidiuscula, ant. rotundata, post. subrostrata, marg. ventr. leviter arcuato.	nitida, polita, distanter striata.	flavescens, obsolete radiata.	plani, $\frac{2}{7}$.	71	38	38	25	N.E. Mexico.
Patularia, *Swains.*									
glauca, *Val.*	obovata, ant. rectangula, post. subrotundata, marg. ventr. arcuato, ant. ascendente.	lævis, tenuis, antice ascendente.	glauco-viridis, obsolete multiradiata.	tumidi, lati, $\frac{1}{3}$.	100	55	58	41	W. Mexico.
globosa, *Lea*	subcircularis, tumida, ant. subangulata, post. rotundata, marg. ventr. medio parum, ant. et post. valde arcuato, area distincta.	lævis, tenuis, lineis incrementi distantibus.	pallide viridis, flavido intermixta, obsolete multiradiata, area postica late radiata.	tumidi, lati, $\frac{3}{7}$.	100–182	73–136	70–?	54–92	E. & S.E. Mexico.
nopalatensis, *Lea*	trigono-cordata, inflata, ant. breviter rotundata, post. rostrata, marg. ventr. medio subsinuato, ant. et post. valde ascendente.	rugis radiantibus exilibus sparsim decussata.	lutescens, postice virescens et subradiata.	tumidi, $\frac{3}{8}$.	139–178	91–122	?–76	?–105	E. Mexico.
tabascensis, *Morel.*	subtrigono-oblonga, inflata, ant. subangustata, producta, post. angulatim rostrata, marg. ventr. valde arcuato.	lævis, tenuis.	viridi-grisea, obscurius zonata.	valde tumidi, latissimi, $\frac{3}{8}$.	149	109	88	?	S.E. Mexico.

grijalvæ, *Morel.*	obovato-oblonga, inflata, ant. angustata, producta, post. rotundata, marg. ventr. pone medium angulatim prominente.	concentrice rude et inæqualiter striata.	castaneo-nigricans.	tumidi, $\frac{2}{7}$.	161–180	96–110	?–10	95	S.E. Mexico.
Scolianodon, *v. Mart.*									
inæquivalvis, *Lea*	obovato-rhomboidea, subalata, subcarinata, ant. subangustata, marg. ventr. valde arcuato.	"lævis," subcarinata.	obscure viridis, subradiata.	prominuli, *inæquales*, $\frac{1}{3}$.	31–42	24–26	26	13–16½	Centr. Nicaragua.
——, var. lenticularis, *Lea.*	suborbiculari-ovata, subalata, marg. ventr. valde arcuato.	concentrice leviter striata, subcarinata.	obscure viridis, radiata.	prominuli, *inæquales*, $\frac{2}{7}$.	35	24	25	14	Centr. Nicaragua.
——, var. granadensis, *Lea.*	oblongo-elliptica, post. subrostrata, marg. ventr. leviter arcuato.	"lævis," subcarinata.	viridis vel flavescens, radiata.	prominuli, inæquales, $\frac{1}{3}$.	35	21	21	14	Centr. Nicaragua.
Euryanodon, *F. & Cr.*									
bambusearum, *Morel.*	elongate obovata, antice et post. rotundata, marg. ventr. leviter sinuato.	antice nitens, postice sublamellosa, solidula.	fusco-castanea, postice obsolete nigro-radiata.	vix prominuli, $\frac{1}{4}$–$\frac{2}{7}$.	49–75	24–34	26–40	14–24	E. & S.E. Mexico.
cylindracea, *Lea*	elongato-reniformis, sat compressa, ant. et post. rotundata, marg. ventr. sinuato.	lævis, tenuis.	castaneo-fusca, obsolete capillaceo-radiata.	paulum prominuli, lati, $\frac{1}{4}$–$\frac{1}{5}$.	71–73	30–32	33–34	23½	E. Mexico.
Glabaris, *Gray.*									
nicaraguæ, *Phil.*	oblongo-elliptica, ant. supra angulata, post. subbiangulata.	lævis, nitida, tenuis.	olivacea, obscure radiata.	prominuli, lati, $\frac{1}{3}$.	65–118	37–64	?64	?41	Centr. Nicaragua.
jewetti, *Lea*	obovato-elliptica, marg. ventr. angulatim convexo.	concentrice subsulcata.	olivacea, postice viridi-radiata.	subtumidi, $\frac{2}{5}$.	106	64	56	47	Centr. Nicaragua.
Pseudoleila, *F. & Cr.*									
ciconia, *A. Gould*	obovato-elliptica, antice ascendens et hians, marg. ventr. medio convexo.	leviter et inæqualiter conc. striata, nitidula.	flavido-olivacea.	tumidi, $\frac{1}{3}$.	77–126	37–61	43–67	26–43	N.W. Mexico.
Pachyanodon, *v. Mart.*									
luteola, *Lea*	obovata, subalata, ant. subangustata, marg. ventr. medio recto.	concentrice striata, subrugosa, tenuis.	flavido-olivacea, postice viridi-biradiata.	subprominuli, $\frac{1}{3}$.	59	35	39	20½	Nicaragua, Panama.
depexa, *v. Mart.*	rhomboideo-obovata, ant. breviter rotundata, marg. ventr. leviter arcuato.	sulcis levibus radiantibus crispato-sculpta, solida.	olivacea.	paulum prominuli, $\frac{1}{3}$.	46–67	29–42	31–45	16–24	N. Guatemala.
tehuantepecensis, *Cr. & F.*	ovalis, solidiuscula, post. oblique et obtuse subtruncata, marg. ventr. arcuato.	concentrice striata, post. sublamellosa, sulcis verticalibus raris.	virenti-castanea, unicolor.	parvi, $\frac{1}{3}$.	56–59	34–35	36–36½	19½–20½	S.W. Mexico.

Distribution of the Subgenera of *Anodonta*.

Atlantic Slope.

	N.E. Mexico.	E. Mexico.	N. Guatemala, S.E. Mexico.	Yucatan.	E. Guatemala.	Honduras.	E. & Centr. Nicaragua.	E. Costa Rica.	N. Panama.
Anodonta, s. str.	*henryana.*	*exilior, lurulenta?*	*lurulenta.*	*lurulenta.*					
Patularia	.....	*globosa, nopalatensis?*	*globosa, tabascensis, grijalvæ.*						
Scolianodon	.....	.....	.....	.....	.....	.....	*inæquivalvis* and varr. *lenticularis* and *granadensis.*		
Euryanodon	.....	*cylindracea, bambusearum.*	*bambusearum.*						
Glabaris	.....	.....	.....	.....	.....	.....	*nicaraguæ, jewetti.*		
Pseudoleila.									
Pachyanodon	.....	.....	.....	.....	.....	.....	*luteola.*	.....	*? luteola.*

Central Mexico, without open drainage.

Anodonta, s. str. [Brachyanodon].	.....	*chalcoensis.*							

Pacific Slope.

	Centr. & N.W. Mexico.	W. Mexico.	S.W. Mexico.	W. Guatemela.	Salvador.	W. Honduras.	W. Nicaragua.	W. Costa Rica.	S. Panama.
Anodonta, s. str.	*coarctata, richardsoni.*	.....	*tehuantepecensis.*						
Patularia	.....	*glauca.*							
Pseudoleila	*ciconia.*								
Pachyanodon	.....	.....	.....	*depexa.*					

g. Long. 46; alt. vert. 27, alæ 33, diam. 14 millim. Vertices in $\frac{2}{7}$ long.
h. „ 36; „ 23, „ 27, „ 10 „ „ $\frac{1}{4}$ „

a–h. Selected from examples collected by Richardson: *a–d*. Apparently full-grown; *a* and *c*. More elongated; *b* and *d*. More elevated and triangular specimens; *e–h*. Apparently young shells.

Young specimens appear to be generally more compressed, less produced behind, and not so distinctly truncated, with the ventral margin more arcuated, and the summits with broadly undulated sculpture.

Hab. CENTRAL MEXICO: Lake of Chapala, State of Jalisco (*Biart & Diguet*[4 5]; *Richardson*); Mexico, without nearer indication of locality [1–3].

This species, living in a lake which drains into the Pacific, resembles in many respects *A. exilior*, Lea, from Eastern Mexico, but it is comparatively more elevated.

Fischer and Crosse's figures of *A. chapalensis* agree so well with that of Küster's *A. coarctata*, that there can be little doubt as to their identity.

The typical specimens of *A. chapalensis* described and figured by the French authors[4 5] seem to be much worn: in their general outlines they are very like the full-grown shells collected by Richardson, but their size is that of the young ones; they also have the anterior part comparatively shorter and more abrupt than in any of the others before me. Nevertheless, I refrain from treating Richardson's specimens as belonging to a different species, as we know that, even in Europe, the shells living in large lakes show a great individual variability. Fischer and Crosse's examples are probably full-grown, young shells being so fragile and brittle that they cannot be worn so much without being broken; I presume that they were found in another part of the same lake, and that this species reaches, when full-grown, a different size in different parts of the lake. I figure several specimens of various ages, in order to show that the younger shells are more orbicular and the older ones more lengthened, especially the very old example (fig. 7).

2. **Anodonta richardsoni**, sp. n. (Tab. XLI. figg. 1, 1 *a*, 2, 2 *a*.)

Triangularly oval, comparatively high, and rather convex, anteriorly lower and rounded, dorsal margin behind the summits somewhat ascending and then without an angle, sloping down convexly to the hinder extremity, which is also rounded, without any distinct angle; ventral margin regularly arcuated. Summits not prominent, in $\frac{1}{3}$ of the length, much worn; in the young shell with feeble undulated sculpture. Periostracum grey, with close concentric striæ and frequent broader ridges, indicating steps of growth, of the same colour. Inside pale dull bluish, often somewhat reddish in the centre.

a. Long. 59; alt. vert. 36, alæ 41, diam. 23 millim. Vertices in $\frac{1}{3}$ long.
b. „ 45; „ 28, „ 32, „ 17 „ „ $\frac{1}{3}$ „
c. „ 41; „ 25, „ 28, „ $15\frac{1}{2}$ „ „ $\frac{1}{3}$ „
d. „ $36\frac{1}{2}$; „ 23, „ 25, „ 12 „ „ $\frac{1}{3}$ „

a. Full-grown; *b–d*. Younger specimens from the Ameca River.

Hab. N.W. MEXICO: Rio Ameca, State of Jalisco (*Richardson*, Dec. 1884).

Somewhat like *A. coarctata*, but more rounded in all respects and dull, without lustre. *A. tehuantepecensis*, Crosse & Fisch., is also nearly allied, but its dorsal margin is more convex, while in *A. richardsoni* it is nearly straight for a short distance, and then descends distinctly downwards for a greater distance.

3. **Anodonta exilior.** (Tab. XL. figg. 8–11.)

Anodon glabrus (sic!), Sowerby, in Reeve's Conch. Icon. xvii., *Anodon*, t. 25. fig. 97 (1870)[1] [nec *Anodonta glabra*, Villa (1841), Bourg. (1888); nec F. J. Schmidt (1847)].

Anodonta exilior, Lea, Proc. Acad. Phil. 1871, p. 188[2]; Journ. Acad. Phil. (2) viii. p. 24, t. 7. fig. 21[3], = Obs. Gen. *Unio*, xiii. p. 28, t. 7. fig. 21[4]; Fisch. & Crosse, Miss. Scient. Mex., Moll. ii. p. 520[5].

Anodonta viridana, Clessin, in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, *Anodonta*, p. 226, t. 75. fig. 5 (copied from Sowerby) (1875–76)[6].

In general appearance not unlike the European *A. piscinalis*, Nilsson; somewhat winged and rostrated, moderately swollen; fore part short, abruptly rounded, in some specimens descending nearly in a perpendicular direction and thus forming an obtuse angle with the dorsal margin before the summits; hinder part distinctly rostrated, its upper margin descending almost in a straight oblique line behind the little prominent wing, its ventral margin ascending in a less degree, in some specimens scarcely at all. Summits not prominent, with a few (4) undulating concentric plaits, worn off, showing a chalk-white layer of shelly matter, and beneath it one of brownish-bronze-colour. Outer surface glossy, dark brownish-green, with rather numerous, more or less distinct, dark-coloured interruptions of growth. Inside bluish or violet-bluish, somewhat iridescent, towards the summits more or less orange or pink.

a.	Long. 69;	alt. vert. 43,	alæ $42\frac{1}{2}$,	diam. 23 millim.	Vertices in $\frac{2}{7}$ long.
b.	„ 60;	„ 35,	„ 36,	„ 20	„	„	$\frac{2}{7}$	„
c.	„ 58;	„ $31\frac{1}{2}$,	„ $35\frac{1}{2}$,	„ 22	„	„	$\frac{2}{7}$	„
d.	„ 57;	„ $31\frac{1}{2}$,	„ $31\frac{1}{2}$,	„ 21	„	„	$\frac{1}{5}$	„
e.	„ 48;	„ 24,	„ $30\frac{1}{2}$,	„ $14\frac{1}{2}$	„	„	$\frac{2}{7}$	„
f.	„ 50;	„ 28,	„ 32,	„ 16	„	„	$\frac{1}{4}$	„

All these measurements taken from specimens from Vera Cruz, as also our figures 8–11.

Hab. E. Mexico: Vera Cruz (*F. D. Godman*); Mexico, without nearer indication of locality (*Sowerby*[1]; *Wheatley*; *Uhde, in Mus. Berol.*).

4. **Anodonta montezuma.**

Anodonta montezuma, Lea, Trans. Am. Phil. Soc. (2) viii. p. 240, t. 23. fig. 55 (1841)[1], = Obs. Gen. *Unio*, iii. p. 78, t. 19. fig. 55[2]; Sowerby, in Reeve's Conch. Icon. xvi., *Anodon*, t. 36. fig. 145[3]; Clessin, in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, *Anodonta*, p. 220, t. 72. figg. 7, 8[4].

A small, somewhat wrinkled shell, without any striking peculiarities.
Long. 38; alt. vert. 25, alæ 24, diam. 15 millim. Vertices in $\frac{2}{7}$ long.

Hab. Central America (*Dr. Jay*[1 2]).

5. **Anodonta chalcoensis.**

? *Anodonta impura*, Say, in New Harmony Disseminator of Useful Knowledge, no. 23, p. 355 (1829)[1]; Complete Writings, ed. Binney, p. 139[2]; Fisch. & Crosse, Miss. Scient. Mex., Moll. ii. p. 537[3].

Anodonta chalcoensis, Crosse & Fisch. Journ. de Conch. xli. p. 110 (1893)[4]; Miss. Scient. Mex., Moll. ii. p. 522, t. 64. figg. 7, 7 *a*[5].

Oval, rounded before and behind, ventral margin well arcuated; periostracum olivaceous or blackish-brown, somewhat lamellated in the hinder part.

Hab. Central Mexico: Lake of Chalco (*Biart*, *Sallé*[4 5]); ? between Mexico city and Tacubaya (*Say*[1–3]).

The identity of Say's species with *A. chalcoensis* is rendered probable by the words

of his description: "umbo much eroded, exhibiting a chalky-white stratum, then a dull wax-yellow surface," and "anterior margin equally rounded with the posterior margin." The first-mentioned character is also to be found in *A. exilior*, Lea, from Vera Cruz, but not in *A. chapalensis* (*coarctata*); this latter, which also inhabits Central Mexico, may be known from *A. chalcoensis* by the very different form of the anterior and posterior extremities. Moreover, the measurements given by Say [1], breadth (=long.) less than two inches (50 millim.), height $2\frac{3}{10}$ inches (=33 millim.), and convexity (diameter) less than $\frac{7}{10}$ (17 millim.), agree well with Fischer and Crosse's figure of *A. chalcoensis* [5].

Tacubaya is a hamlet in the immediate vicinity of the Mexican capital, and a little to the west of it.

The Lake of Chalco is the eastern portion of the great freshwater-basin in the southern part of the elevated plateau of Mexico, and artificially separated from the western portion, the Lake of Xoibimilco; it has no open drainage, either to the Atlantic or to the Pacific Ocean.

6. **Anodonta lurulenta.**

? *Anodon lurulentus,* Morelet, Test. Noviss. i. p. 28 (1849) [1].

Anodonta lurulenta, Fisch. & Crosse, Miss. Scient. Mex., Moll. ii. p. 523, t. 64. figg. 6, 6 *a* [2].

Anodonta strebeli, Lea, Proc. Acad. Phil. 1868, p. 150 [3]; Journ. Acad. Phil. (2) vi. p. 122, t. 52. fig. 135 [4],=Obs. Gen. *Unio,* xii. p. 82, t. 52. fig. 135 [5]; Clessin, in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, *Anodonta,* p. 138, t. 42. figg. 5, 6 (copied from Lea) [6]; Fisch. & Crosse, loc. cit. p. 524 [7].

Oval-oblong, produced before, subrostrated behind, green, with numerous narrow rays, according to Fischer and Crosse shining in the fore half, sublamellated in the hinder half.

a. Long. 54; alt. vert. $29\frac{1}{2}$, alæ $30\frac{1}{2}$, diam. 19 millim. Vertices in $\frac{1}{3}$ long.
b. „ 40; „ 22, „ 23, „ $15\frac{1}{2}$ „ „ $\frac{2}{7}$ „

Hab. E. Mexico: Vera Cruz (*Strebel* [3–7]).
Yucatan: San Gerónimo (*Morelet* [2]).
N. Guatemala: marshes of the Rio Usumacinta (*Morelet* [1]).

The identity of Morelet's and Fischer and Crosse's specimens, at first sight, seems doubtful, as Morelet gives a different locality to that indicated on the tablets on which Fischer and Crosse's examples are fixed, and also a different height to the shell (47 millim.), whereas the length he mentions is the same as that of Fischer and Crosse's specimens (53–54 millim.); *i. e.*, in Morelet's description the height is eight-ninths of the length, in Fischer and Crosse's description and figure five-ninths. If Morelet's measurement is correct, his species must be quite different. E. Smith, however, informs me that there is no specimen corresponding to the height mentioned in Morelet's collection, now in the British Museum, and that of the three examples representing *A. lurulenta*, the largest is evidently the shell figured by Fischer and Crosse, these being marked "Marais de S. Geronimo, Yuc."; he thinks, therefore, that "altitud 47" must be a typographical error for "altitud 31."

The specific name "lurulentus" is a problematic Latin word, said to have been employed by Apulejus in the second century, in the sense of "muddy," allied to "luridus" and "luror," dun-colour. The more important authors use "lutulentus" in the same sense, from "lutum," mud.

7. **Anodonta henryana.**

Anodonta henryana, Lea, Proc. Acad. Phil. 1857, p. 102 [1]; Journ. Acad. Phil. (2) iv. p. 373, t. 66. fig. 198 [2],=Obs. Gen. *Unio*, viii. p. 55, t. 66. fig. 198 [3]; Clessin, in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, *Anodonta*, p. 141, t. 45. figg. 5, 6 [4]; Fisch. & Crosse, Miss. Scient. Mex., Moll. ii. p. 525 [5].

Anodon henryana, Sowerby, in Reeve's Conch. Icon. xvii., *Anodon*, t. 34. fig. 140 [6].

Oblong, rather swollen, summits flat; fore part short, rounded, hinder part distinctly beaked.
Long. 71; alt. vert. 38, alæ 38, diam. 25 millim. Vertices in $\frac{2}{7}$ long.

Hab. N.E. Mexico: Matamoros and Tamaulipas (*Berlandier* [1–6]).

Dedicated to Prof. Joseph Henry, Secretary of the Smithsonian Institution.

Patularia, Swains.

8. **Anodonta glauca.**

Anodonta glauca, Valenciennes, in Lamarck's Hist. Nat. d'Anim. sans Vert. vi. 1, p. 87 (1819) [1]; ed. 2, par Deshayes, vi. p. 569 [2]; Valenciennes, in Humboldt et Bonpland's Obs. Zool. ii. p. 236, t. 1. fig. 2 (1833) [3]; Delessert, Recueil des Coquilles décrites par Lamarck, t. 13. fig. 3 (1841) [4]; Hanley, Cat. Recent Bivalv. p. 221 [5]; Fisch. & Crosse, Miss. Scient. Mex., Moll. ii. p. 533, t. 69. figg. 1, 1 *a* [6] [nec *A. glauca* (Val.), Sowerby, Clessin].

Much rounded, angulated before, ventral margin strongly arcuated; colour bluish-green.
Long. 100; alt. vert. 55, alæ 58, diam. ? millim. Vertices in $\frac{1}{3}$ long. (Figure given by Delessert [4].)
a. Long. 112; alt. vert. 68, alæ ?, diam. 38 millim. Vertices in ? long.
b. „ 100; „ 55, „ 58, „ ? „ „ $\frac{1}{3}$ „
a. Figure given by Delessert; *b*. Measurements of another Lamarckian specimen recorded by Fischer and Crosse.

Hab. W. Mexico: freshwaters near Acapulco (*Humboldt* [1–6]).

Fischer and Crosse [6] mention also a specimen given to them by M. Sallé, with the locality Nicaragua, which seems to be somewhat doubtful.

The sinulus of the ligament, according to the figure given by Delessert [4], appears to be rather large and deep, but not pointed, *A. glauca* approaching nearer in this respect to the North-American *A. grandis*, Say, and the Chinese *A. woodiana*, Lea, than to the South-American species of the subgenus *Glabaris*. For *A. glauca* of Sowerby and Clessin, see *A. ciconia*, p. 536.

9. **Anodonta globosa.**

Anodonta globosa, Lea, Trans. Am. Phil. Soc. (2) viii. p. 241, t. 24. fig. 56 (1841) [1],=Obs. Gen. *Unio*, iii. p. 79, t. 24. fig. 56 [2]; Clessin, in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2,

Anodonta, p. 213, t. 65. figg. 3, 4 [3] (copied from Lea); Fisch. & Crosse, Miss. Scient. Mex., Moll. ii. p. 529, t. 68. figg. 1, 1 *a* [4]; Pilsbry, Proc. Acad. Phil. 1892, p. 339 [5].

Anodon globosa, Sowerby, in Reeve's Conch. Icon. xvii., *Anodon*, t. 35. fig. 141 [6].

Very inflated, outline of the lower half nearly circular, anterior angle not very distinct; green, some specimens with yellowish zones, with darker green rays, narrow and indistinct in the greater part of the shell, broader and more distinct on the hinder area; sculpture of the summits, if preserved, finely waved.

a. Long. 100; alt. vert. 73, alæ 70, diam. 54 millim. Vertices in $\frac{3}{7}$ long.
b. „ 116; „ 88, „ 74, „ 73 „ „ $\frac{3}{8}$ „
c. „ 182; „ 136, „ ?, „ 92 „ „ ? „

a. Lea's figure; *b*. Specimen from Tlacotalpam in Strebel's collection; *c*. Pilsbry's measurements [5].

Hab. E. Mexico: Lake Concha, near Tlacotalpam, about 20 leagues south of Vera Cruz (*Dr. C. Burrough* [1–5]).

S.E. Mexico: San Juan Bautista in Tabasco (*Rovirosa* [5]).

10. **Anodonta nopalatensis.**

Anodon nopalatensis, Sowerby, in Reeve's Conch. Icon. xvii., *Anodon*, t. 16. fig. 58 (1867) [1].

Anodonta nopalatensis, Clessin, in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, *Anodonta*, p. 223, t. 73. fig. 3 [2] (copied from Reeve); Fisch. & Crosse, Miss. Scient. Mex., Moll. ii. p. 531 [3].

Summits very broad and prominent, much advanced; ventral margin straight, even subsinuated in its middle part, steeply ascending before and behind; outside dark greenish-brown.

Long. 149; alt. vert. 109, alæ 88, diam. ? millim. Vertices in $\frac{3}{8}$ long.

Hab. E. Mexico: Rio Nopalapa * (Nopalata) (*Princep* [1 2]).

11. **Anodonta tabascensis.**

Anodonta tabascensis, Morelet, Journ. de Conch. xxxii. p. 124 (1884) [1]; Fisch. & Crosse, Miss. Scient. Mex., Moll. ii. p. 530, t. 62. fig. 1 [2].

Very near *A. nopalatensis*, but more produced before and behind; outside yellowish or reddish; summits tuberculated.

a. Long. 173; alt. vert. 122, alæ ?, diam. 105 millim.
b. „ 170; „ 122, „ ?, „ 104 „
c. „ 139; „ 91, „ 76, „ ? „ Vertices in $\frac{2}{5}$ long.

a. Fischer and Crosse's measurements of a specimen collected by Morelet; *b*. Morelet's measurements; *c*. Figure given by Fischer and Crosse [2].

Hab. S.E. Mexico: swamps in the State of Tabasco (*Morelet* [1 2]).

This is perhaps only a variety of *A. nopalatensis*, as in Strebel's collection, now at the Museum in Hamburg, there are two intermediate specimens, these approaching *A. nopalatensis* in the shape of the fore part of the shell, but not having the ventral margin subsinuated nor so steeply ascending behind; it is to be regretted that no

* Edg. Smith has been kind enough to inform me that the typical shell in the British Museum, a single left valve, is labelled "Nopalapa, leg. A. Princep." Dr. Seler, of Berlin, who is well versed in Mexican geography and antiquities, tells me that Nopal-apa or Nopal-apan signifies Indian-fig water in the Mexican language, and that there are at least three localities of that name in Mexico—one on the central plateau, one in the State of Vera Cruz, and one in Tabasco. The second of these, situated in the district of Arayucan, in the southern part of the State of Vera Cruz, on the river San Juan, is probably the correct one.

indication of locality is given for them. As all these large-sized *Anodontæ* are rare in collections, the range of their individual variation is still unknown.

12. **Anodonta grijalvæ.**

Anodonta grijalvæ, Morelet, in Journ. de Conch. xxxii. p. 123 (1884) [1]; Fisch. & Crosse, Miss. Scient. Mex., Moll. ii. p. 331, t. 59. fig. 1 [2].

More elongated than the preceding, low and somewhat produced before, rounded behind; ventral margin scarcely arcuated, but with a peculiar prominence somewhat behind the middle; outside dark brown.

a. Long. 161; alt. vert. 96, alæ 70, diam. 95 millim. Vertices in $\frac{2}{7}$ long.
b. „ 180; „ 110, „ ?, „ 95 „ „ ? „

a. Fischer and Crosse's figure; *b*. Morelet's measurements.

Hab. S.E. Mexico: Rio de los Idolos, one of the branches of the Rio Grijalva, State of Tabasco (*Morelet* [1 2]).

The name Grijalva was given to this river in honour of one of the first Spanish discoverers in this part of the world, Juan Grijalva, 1518.

Scolianodon, v. Mart.

13. **Anodonta inæquivalvis.**

Anodonta atrovirens, Philippi, in Zeitschr. f. Malak. v. p. 130 (1848) [1].

Anodonta inæquivalva, Lea, Proc. Acad. Phil. 1868 p. 95 [2]; Journ. Acad. Phil. (2) vi. p. 292, t. 43. fig. 108 [3],=Obs. Gen. *Unio*, xii. p. 52, t. 43. fig. 108 [4].

Anodonta inæqualis (Lea), Tate, Am. Journ. of Conch. v. p. 160 (1870) [5].

Oval, fore part somewhat produced, hinder part rather high, angulated, ventral margin rounded. Outside dark green or yellowish-green, obscurely radiated; inside bluish-white and very iridescent.

a. Long. 42; alt. vert. 26, alæ 26, diam. 16½ millim. Vertices in $\frac{1}{3}$ long.
b. „ 31; „ 24, „ ?, „ 13 „ „ ? „

Hab. Central Nicaragua: Lake of Nicaragua (*Bridges* [2–4]); Lake Nicaragua, near San Ubaldo, Rio Malacotoya (*Tate* [5]); Nicaragua, without nearer indication of locality (*Largilliert* [1]).

All the specimens seen by Lea were slightly inequivalve, having the beak of the left valve a little higher than that of the right, and having a slight flexure on the superior anterior margin. This peculiarity is also visible in some species of *Unio* from the same lake, see *anteà*, pp. 483, 498.

Var. *lenticularis*.

Anodonta lenticularis, Lea, Proc. Acad. Phil. 1868, p. 95 [6]; Journ. Acad. Phil. (2) vi. p. 290, t. 41. fig. 102 [7],=Obs. Gen. *Unio*, xii. p. 50, t. 41. fig. 102 [8].

Comparatively higher and more circular than the preceding; fore part short, rounded, hinder part scarcely angulated; ventral margin strongly arcuated. Outside "dark green and very much radiated"; inside bluish-white and very iridescent.

Long. 35; alt. vert. 24, alæ 25, diam. 14 millim. Vertices in $\frac{2}{7}$ long.

Hab. Central Nicaragua: Lake of Nicaragua (*Bridges* [6–8]).

Anodonta cornea, Philippi, Zeitschr. f. Malak. v. p. 130 (1848), also from Nicaragua (*Largilliert*), resembles this species, according to description; but as the author says "margine angustato, subrostrato," I dare not identify it with Lea's species.

Var. *granadensis*.

Anodonta granadensis, Lea, Proc. Acad. Phil. 1868, p. 96[9]; Journ. Acad. Phil. (2) vi. p. 288, t. 41. fig. 100[10],=Obs. Gen. *Unio*, xii. p. 48, t. 41. fig. 100[11].

More oblong, fore part also short and rounded, hinder part somewhat more distinctly rostrated, ventral margin straight at its middle. Outside yellowish or green-rayed; inside bluish-white, very iridescent. Long. 35; alt. vert. 21, alæ 21, diam. 14 millim. Vertices in $\frac{1}{3}$ long.

Hab. CENTRAL NICARAGUA: Lake of Nicaragua (*Bridges* [9–11]).

EURYANODON, Fisch. & Crosse.

14. **Anodonta bambusearum.**

Anodon bambousearum, Morelet, Test. Noviss. ii. p. 24 (1851)[1].

Anodonta bambousearum, Fisch. & Crosse, Miss. Scient. Mex., Moll. ii. p. 527, t. 63. figg. 6, 6 *a*[2].

Anodonta pepiniana (Lea), Clessin, in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, *Anodonta*, p. 158 (part.)[3].

Near *A. cylindracea*, but higher behind the summits, scarcely sinuated below, and not so distinctly bent downwards behind, with a few dark rays on the hinder slope of the shell. Sinulus of the ligament sharply triangular, as deep as long; anterior side concave, posterior side convex, point bent forwards.

a. Long. 75; diam. vert. 34, alæ 40, diam. 24 millim. Vertices in $\frac{1}{4}$ long.
b. „ 49; „ 24, „ 26, „ 14 „ „ „ $\frac{2}{7}$ „

a. Morelet's specimen, figured by Fischer and Crosse; *b*. Specimen from Misantla.

Hab. E. MEXICO: Rio de Misantla (*Deppe, in Mus. Berol.*).

S.E. MEXICO: small streams near Palenque, State of Chiapas (*Morelet* [1 2]).

15. **Anodonta cylindracea.**

Anodonta cylindracea, Lea, Trans. Am. Phil. Soc. vi. p. 45, t. 8. fig. 40 (1836)[1],=Obs. Gen. *Unio*, ii. p. 45, t. 13. fig. 40[2]; Hanley, Catal. Rec. Bivalves, p. 223[3]; Clessin, in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, *Anodonta*, p. 161, t. 53. figg. 5, 6[4]; Fisch. & Crosse, Miss. Scient. Mex., Moll. ii. p. 528[5].

Anodon cylindracea, Sowerby, in Reeve's Conch. Icon. xvii., *Anodon*, t. 24. fig. 93[6].

Elongated, but not truly cylindrical, because the diameter in the most convex part is only a little more than two-thirds of the height; posterior extremity bent downwards, ventral margin a little sinuated.

a. Long. 73; alt. vert. 32, alæ 33, diam. 23½ millim. Vertices in $\frac{2}{7}$–$\frac{1}{4}$ long.
b. „ 71; „ 30, „ 34, „ 3 „ „ $\frac{1}{5}$ „

Hab. E. MEXICO: Rio Medellin, near Vera Cruz (*Dr. Burrough* [1 2 3]).

Externally, this species bears a remarkable resemblance to *Unio aztecorum*, Phil., from the same region. Fischer and Crosse[5] distinguish the form figured by Sowerby[6] as var. *subarcuatula*, but there is no reason to give it a distinct name. It is to be regretted that Lea, who figures in most species the sinulus of the ligament very clearly, did not indicate it at all in this shell. From its resemblance, however, to

A. bambusearum and to some South-American forms, e. g. *A. amazonensis*, Lea (Obs. Gen. *Unio*, x. t. 46. fig. 300, and Sowerby's fig. 120), from the Upper Amazons, I conclude that *A. cylindracea* also has a triangular sinulus.

GLABARIS, Gray.

16. **Anodonta nicaraguæ.**

Anodonta nicaraguæ, Philippi, in Zeitsch. f. Malak. v. p. 130 (1848) [1].

Anodonta bridgesii, Lea, Proc. Acad. Phil. 1868, p. 95 [2]; Journ. Acad. Phil. (2) vi. p. 290, t. 42. fig. 104 [3],=Obs. Gen. *Unio*, xii. p. 51, t. 42. fig. 104 [4]; Tate, Am. Journ. of Conch. v. p. 160 (1870) [5].

Oblong, angulated at both ends of the dorsal margin. Ventral margin rounded in the younger shell, straight and even a little sinuated in the old one.

a. Long. 118; alt. vert. 64, alæ 64, diam. 41 millim. Vertices in $\frac{1}{3}$ long.

b. „ 65; „ 37, „ ?, „ 10? „ „ ? „

a. Figure given by Lea [3 4]; *b*. Measurements given by Philippi, reduced to millimetres.

Hab. CENTRAL NICARAGUA: Lake of Nicaragua (*Bridges* [2–4]); Nicaragua, without nearer indication of locality (*Largilliert* [1]); Rio Tipitapi (north side of the lake) and sand-bar north of the Rio Estar (*Tate* [5]).

I have no doubt that Philippi's species is the same as that of Lea: the only difficulty is that Philippi describes the ventral margin as equally rounded, whereas in Lea's figure it is straight and even a little sinuated in the middle; but such a difference is often to be seen between younger and old specimens of the same species in this genus, and it can even be traced in the lines of growth in Lea's figure. The diameter given by Philippi [1] is very small, less than one-seventh of the length, which indicates a strongly compressed shell; but as he himself describes the shell as swollen (tumida), it is probable that some error has been made by the printer.

17. **Anodonta jewetti.**

Anodonta jewettiana, Lea, Proc. Acad. Phil. 1868, p. 95 [1].

Anodonta jewettii, Lea, Journ. Acad. Phil. (2) vi. p. 289 [2],=Obs. Gen. *Unio*, xii. p. 49, t. 41. fig. 101 [3]; Clessin, in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, *Anodonta*, p. 135, t. 44. figg. 1, 2 [4] (copied from Lea).

Near in form to *A. ciconia*, but more swollen, the summits comparatively less advanced, and the fore side not gaping.

Hab CENTRAL NICARAGUA: Lake of Nicaragua (*Bridges* [1–3]).

A. areolata, Sowerby (Reeve, Conch. Icon. xvii., *Anodon*, t. 10. fig. 28), locality unknown, seems to be very near this species.

PSEUDOLEILA, Fisch. & Crosse.

18. **Anodonta ciconia.** (Tab. XLI. fig. 4.)

Anodon sinuosus, Swainson, Exotic Conch. t. 16 (1841) [1] (nec *Anodonta sinuosa*, Lam., 1819).

Anodonta ciconia, A. Gould, Proc. Bost. Soc. Nat. Hist. iv. p. 92 (1851) [2]; Carpenter, Catal. of

Mazatlan Shells, p. 117[3]; Fisch. & Crosse, Miss. Scient. Mex., Moll. ii. p. 534, t. 68. figg. 2, 2 *a*[4].

Anodon ciconia, Sowerby, in Reeve's Conch. Icon. xvii., *Anodon*, t. 29. fig. 115 *a*[5].

Anodon glaucus (Lam.), Sowerby, in Reeve's Conch. Icon. xvii., *Anodon*, t. 27. fig. 105 *a*[6].

Anodonta glauca (Val.), Clessin, in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, *Anodonta*, p. 222, t. 73. fig. 4 (copied from Sowerby)[7].

Anodonta glauca, Lam., var. *sinaloensis*, Crosse & Fisch. Journ. de Conch. xxxi. p. 219 (1883)[8].

Remarkable for its large size, conspicuously low form, and the upwardly bent and gaping fore part, which give it the appearance of a species of the South-American genus *Leila*; but differing from them in having the pallial line running direct to the impression of the posterior adductor, without an acutangular sinus.

a.	Long.	126;	alt. vert.	61,	alæ	67,	diam.	43 millim.	Vertices in	$\frac{1}{3}$	long.
b.	,,	106;	,,	56,	,,	56,	,,	$35\frac{1}{2}$,,	,,	$\frac{1}{3}$	,,
c.	,,	102;	,,	$57\frac{1}{2}$,	,,	$57\frac{1}{2}$,	,,	35 ,,	,,	$\frac{1}{3}$	,,
d.	,,	95;	,,	$50\frac{1}{2}$,	,,	53,	,,	$34\frac{1}{2}$,,	,,	$\frac{1}{3}$	,,
e.	,,	93;	,,	49,	,,	53,	,,	34 ,,	,,	$\frac{1}{3}$	,,
f.	,,	87;	,,	45,	,,	50,	,,	28 ,,	,,	$\frac{1}{3}$	,,
g.	,,	77;	,,	37,	,,	43,	,,	26 ,,	,,	$\frac{2}{7}$	,,

Hab. N.W. Mexico: Mazatlan, not uncommon (*Melchers, in coll. Dunker; Reigen*[2]; *Forrer; Richardson*).

The measurements given above, all from Mazatlan shells obtained by various collectors, indicate a moderate variability in the relation of the height to the length. The outside is constantly of a yellowish-olivaceous colour. The inside is, according to Carpenter[3], salmon-colour, in the young shell silvery, light, or flesh-colour; in adult shells (*a*–*f*) it is also silvery, with a faint reddish or orange hue, in the evidently young specimen (*g*) pale bluish. In one example before me (Tab. XLI. fig. 4) there are curious oblique scratches inside, looking like casts of the swollen gills, and others, narrower and less oblique in the fore part, like casts of the mantle; these latter are also more or less distinctly visible in some other specimens. The sinulus of the ligament is deeply triangular, bent forwards.

The figure given by Sowerby[5], as an old example of *A. ciconia*, fig. 115 *b*, differs so much in general outlines that I doubt if it belongs to the same species.

The specific name refers to a fancied resemblance of the shell to the bill of a stork. Fischer and Crosse[4] give, besides Mazatlan, as another locality, "Rio del Presidio," quoting Forrer as authority. The specimens acquired from this collector by the Berlin Museum bear the label "Presidio" simply, Presidio de Mazatlan being the name of the inland town, to distinguish it from the port, Puerto de Mazatlan.

PACHYANODON, v. Mart.

19. Anodonta luteola.

Anodonta luteola, Lea, Proc. Acad. Phil. 1858, p. 118[1]; Journ. Acad. Phil. (2) iv. p. 267, t. 43. fig. 147[2], = Obs. Gen. *Unio*, vii. p. 85, t. 43. fig. 147[3]; Clessin, in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, *Anodonta*, p. 122, t. 37. figg. 1, 2 (copied from Lea)[4]; Tate, Am. Journ. of Conch. v. p. 160 (1870)[5].

Hab. Nicaragua: in a river at Tierra Blanca and Rio Malacatoya (*Tate* [5]).
Panama: Isthmus of Darien (*H. C. Caldwell, U.S.N.*).

Clessin [4] points out rightly that the ligamental sinulus of the dorsal margin assigns to this species a place among the rounded South-American *Anodontæ*.

20. **Anodonta depexa,** sp. n. (Tab. XLI. figg. 3, 3 *a–c.*)

Testa solida, rhomboideo-obovata, modice convexa, sulcis levibus radiantibus et striis concentricis crispatis sculpta, olivacea, verticibus paulum prominulis, antice breviter rotundata, margine dorsali posteriore rectilineo paulum ascendente, angulo obtuso terminato, margine ventrali leviter arcuato, extremitate postica subrostrata, supra declivi, infra rotundata; facie interna pallide cærulescente, zona marginali opaca, submarginali valde iridescente; sinulus ligamenti triangularis, antrorsum versus, margine anteriore fere perpendiculari.

a. Long. 67; alt. vert. 41½, alæ 45, diam. 24 millim. Vertices in ⅓ long.
b. „ 64; „ 39½, „ 45, „ 23½ „ „ ⅓ „
c. „ 46; „ 29, „ 31, „ 16 „ „ ⅓ „

Hab. W. Guatemala: Paso Antonio, in the lower part of the Rio Michatoya (*Stoll*).

Three specimens of nearly equal size, and a younger one (*c*), are before me, all having shallow furrows radiating from the summits towards the ventral margin, which cut the concentric striæ of growth and cause them to become more or less frilled; in the fore and hinder parts of the shell these furrows are not to be seen, and in the hinder part, at a determined line, they disappear and the concentric lines become simple, more crowded, and somewhat membranaceous and projecting, the appearance here being more dull and dirty, contrasting with the somewhat shining olivaceous colour of the middle and fore parts. This peculiarity is visible in all four examples, but in a somewhat different degree; whether it is due to the structure of the periostracum, or caused by the fore and middle parts of the length being more worn than the hinder part, it is impossible to say. I know of no other *Anodonta* or *Glabaris* with similar structure *; the general form and solidity of the shell, as well as the well-marked dull (lustreless) marginal zone, prove that it belongs to the South-American group of *Anodonta latemarginata*, Lea.

21. **Anodonta tehuantepecensis.**

Anodonta tehuantepecensis, Crosse & Fisch. Journ. de Conch. xli. p. 92 (1893) [1]; Miss. Scient. Mex., Moll. ii. p. 526, t. 70. figg. 1, 1 *a* [2].

According to Strebel's specimens, very near the preceding (*A. depexa*), also solid, with broad lustreless marginal zone on the inside and a triangular sinulus of the ligament; but somewhat more oblong, and with only a few feeble and scattered vertical furrows on the outside.

a. Long. 56; alt. vert. 35, alæ 36½, diam. 19½ millim. Vertices in ⅓ long.
b. „ 59; „ 34, „ 36, „ 20½ „ „ ⅓ „

Hab. S.W. Mexico: Cacoprieto, near Tapana, east of Tehuantepec (*Sumichrast* [1 2]); Cerro Negro, near Santa Efigenia, State of Tehuantepec (*Sumichrast, in coll. Strebel*).

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* Perhaps *A. chalcoensis*, "periostracum lamellated in the hinder part" (*v. anteà*, p. 530), bears some resemblance.

Doubtful Central-American Species.

Anodonta cherziana.

Anodonta cherziana (Rang), Villa, Dispos. Syst. Conch. terr. et fluv. p. 40 (1841) [1].

Hab. Mexico, without nearer indication of locality [1].

The name *A. cherziana* is very probably an incorrect rendering of *A. chaiziana* Rang [Nouv. Ann. du Mus. d'Hist. Nat. Paris, iv. f. 28 (1835)], which has been found in Senegal, and not in Mexico.

Anodonta cornea.

Anodonta cornea, Philippi, Zeitschr. f. Malak. v. p. 130 (1848) [1].

Hab. Nicaragua (*Largilliert* [1]).

See *anteà*, p. 535.

Anodonta holtonis.

Anodonta holtonis, Lea, Proc. Acad. Phil. 1857, p. 85 [1]; Journ. Acad. Phil. (2) iii. p. 316, t. 32. fig. 31 [2], = Obs. Gen. *Unio*, vi. p. 36, t. 32. fig. 31 [3].

Mentioned by Lea, Index to vols. i.–xi. of Obs. Gen. *Unio*, 1867, p. 20, among the species from Mexico and Central America; but in the descriptions themselves [1–3], Cartago *, New Granada, Rev. J. F. Holton, are given as locality and collector. The shell from Rio Purificacion, a confluent of the Rio Magdalena, Colombia, figured by Clessin (in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, t. 50. figg. 5, 6), now in the Berlin Museum, differs, however, from Lea's specimen in having the ventral margin sinuated and the hinder extremity blunter and bent downwards; it approaches nearer to the group of *A. tenebricosa*, Lea.

MYCETOPUS.

Mycetopus, d'Orbigny, Mag. Zool. 1835, p. 41; Voy. dans l'Am. mér., Moll. p. 600.

Nearly allied to *Anodonta*, but distinct by the cylindrical foot of the animal, swelling and expanding into a disc at the fore end. Shell elongated, distinctly gaping at the anterior part of the ventral margin, as in *Leila* and in *Pseudoleila*, rather compressed, somewhat concentrically striated, not shining, rather thin; no teeth in the hinge; sinulus triangular, but small.

The known species are from Central or South America.

Nomen.	Forma.	Sculptura.	Color. ext.	Vertices.	Long.	Alt. vert.	Alt. alæ.	Diam.	Patria.
subsinuatus, *Sav.*	elongata, compressa, postice altior, marg. ventr. ant. subsinuato.	lævis, nitida.	virescenti-flava.	plani, $\frac{1}{4}$.	mm. 118–132	mm. 30–34	mm. 42–45	mm. 23	W. Guatemala.
weddelli, *Hupé.*	elongata, antice rotundata, postice subrostrata.	lævis, lineis nonnullis radiantibus.	corneo-flava, nitida.	plani, $\frac{3}{11}$.	84	24	?	$12\frac{1}{2}$	Centr. Nicaragua.

* There is a place of this name in Colombia, on the Cauca River, an affluent of the Magdalena.

1. **Mycetopus subsinuatus.** (Tab. XLI. figg. 5, 5 *a*.)

Mycetopus subsinuatus, Sowerby, in Reeve's Conch. Icon. xvi., *Mycetopus*, t. 4. fig. 10 (1868) [1].

Shell pod-shaped, in the hinder part higher, narrowed before, rounded at the fore extremity; dorsal margin ascending in a straight line posteriorly, forming an obtuse angle at the hinder end of the ligament in five-sevenths of the whole length, thence descending obliquely to the hinder extremity, which is more rounded than angulated; ventral margin gaping and slightly sinuated in its anterior half, moderately convex in the hinder half. Periostracum greenish-yellow. Summits in scarcely one-fourth of the whole length, not prominent, decorticated. Sinulus longer than deep, with a downwardly directed point nearer its anterior end. Inside whitish, somewhat dull.

a. Long. 132; alt. vert. $32\frac{1}{2}$, alæ 43, diam. 23 millim.
b. „ 125; „ 34, „ 45, „ 23 „
c. „ 118; „ 30, „ 42, „ ? „
a, *b*. Guatemalan specimens collected by Stoll; *c*. Sowerby's type from Bogota.

Hab. W. Guatemala: Paso Antonio, in the Pacific coast region (*Stoll*).
Colombia: Bogota [1].

I figure one of Stoll's specimens in order to show its close resemblance to Sowerby's figure.

2. **Mycetopus weddelli.**

Mycetopus weddelli, Hupé, in Castelnau's Anim. nouv. ou rares de l'Amérique du sud, Mollusques, p. 93, t. 20. fig. 2 [1]; Tate, Am. Journ. of Conch. v. p. 160 (1870) [2].

Hab. Central Nicaragua: on the muddy margins of the Rio Tipitapa (*Tate* [2]).
The type was from the confines of Brazil and Bolivia, from Santa Ana de Chiquitos [1].

It is not very probable that the Nicaraguan and Chiquitos shells belong to the same species, but I can give no more information beyond what is mentioned in the comparative table (*anteà*, p. 539).

Fam. CYRENIDÆ.

[Gray (1840); Lamarck, Conchifères fluviatiles (1819); Férussac, Cyclades (1821).]

Bivalves with distinct anterior and posterior lateral teeth, and some smaller cardinals between them, usually of rounded or triangular outline, not much longer than high, without iridescent pearly appearance of the inside, generally of moderate or small size. Mantle open before, closed at the hinder part, with two distinct openings directed backward.

POLYMESODA.

Polymesoda, Rafinesque, Ann. gén. des Sciences Physiques, Bruxelles, 1820, pp. 287 et seq., and in Chenu's Bibliothèque Conchyliologique, p. 27; Complete Writings of C. R. Rafinesque, ed. Binney and Tryon, p. 61 (1864) (as a subgenus of *Cyclas*, type *Cyrena carolinensis*, Bosc). More distinctly defined by Mörch, in Malak. Blätt. vii. p. 193 (1860–61).
Leptosiphon, Fischer, Manuel de Conch. p. 1000 (1872) (as a subgenus of *Cyrena*).
Neocyrena, Fischer & Crosse, Miss. Scient. Mex., Moll. ii. p. 634 (1894).

Shell moderate in size. Three converging cardinal teeth in each valve; anterior lateral teeth shorter than the posterior, not serrated. A small but distinct pallial sinus. Outlines triangular, obliquely cordiform or rounded (as in the genus *Venus*); inside often violet. Hinder orifices of the mantle prolonged into short siphons.

Peculiar to America, ranging from Georgia and California to Bolivia.

The presence of the pallial sinus may well be regarded as a generic character, more particularly as it coincides with the geographical distribution, all the species being American and the *Cyrenæ*-proper without pallial sinus belonging to the tropical regions of the Old World.

Polymesoda, evidently a shortened form of *Poly-mes-odonta*, with many middle teeth.

The species of this genus may be arranged in three subdivisions, viz.:—

I. Polymesoda, s. str. See above, p. 540.—Shell very thick, rounded-triangular, concentrically ridged; hinder part of the dorsal margin obliquely descending to the junction with the ventral margin, more or less swollen; summits moderate, close together. Type *P. carolinensis*, Bosc. Geographical distribution as stated above for the whole genus, but not known from the West Indian islands.

II. Egeta, H. & A. Adams, Gen. Moll. ii. p. 651 (1858) : *Cyrena* (*Anomala*), Deshayes, P. Z. S. 1854, p. 21 (without definition); *Cyrenæ anomalæ, b.* testa tenuis, rotundata, cordiformis, Deshayes, Catal. Conchifera Brit. Mus. ii. p. 257. [Nec *Anomala*, Stephens (1830), Burmeister, Laporte.]—Shell comparatively thinner, very swollen, concentrically striated, with broad prominent summits, which are usually much decorticated; general outline more obliquely cordiform than triangular, biangulated behind. Species peculiar to Central America and Colombia.

III. Cyrenocapsa, Fischer, Ann. Lyc. N. York, 1872, p. 194; Journ. de Conch. xx. p. 404 (1874); Fischer & Crosse, Miss Scient. Mex. ii. p. 18 (1894).—Shell thin, smaller in size, oval, much longer than high, nearly smooth. Hinge-plate narrow. Pallial sinus indistinct. Species chiefly estuarine. Type *C. salmacida*, Morel. Yucatan, Cuba, Bahama Islands, and Florida.

The species said to be estuarine will be dealt with later among the brackish-water forms, but for convenience (as in *Neritina*) they are included here in the Comparative Table; it is, however, quite possible that some of those supposed to live in fresh water will prove to be estuarine.

1. **Polymesoda olivacea.** (Tab. XLII. figg. 6, 6 *a*.)

Cyrena fontainei, Philippi, in Zeitschr. f. Malak. 1851, p. 70[1]; Deshayes, Catal. Conchifera Brit. Mus. ii. p. 253[2] (nec d'Orbigny, 1844).

Cyrena olivacea, Carpenter, Catal. Mazatlan Shells, p. 114 (1857)[3]; Mollusks of W. N. America, p. 27 (1872)[4]; Prime, Monogr. Am. Corbiculadæ, p. 17, fig. 12 (1865)[5]; Clessin, in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, *Cycladeen*, p. 114, t. 16. figg. 5, 6 (1877)[6]; Sowerby, in Reeve's Conch. Icon. xx., *Cyrena*, t. 9. fig. 32[7]; Fisch. & Crosse, Miss. Scient. Mex., Moll. ii. p. 634, t. 70. figg. 5, 5 *a*, *b*[8].

Comparative Table of the Species of *Polymesoda*.

Nomen.	Forma.	Sculptura.	Coloratio externa.	Vertices.	Sinus pall.	Long.	Alt.	Diam.	Patria.
I. Polymesoda, s. str.						mm.	mm.	mm.	
olivacea, *Carp.*	subtriangularis, antice producta, marg. ventr. arcuato, postice subsinuato; convexa.	striæ concentr. planatæ, inæquales.	griseo-viridis, opaca.	convexi, subacuti, contigui, $\frac{2}{5}$–$\frac{3}{5}$.	erectus, acutus, mediocris.	54–62	45–53	30–34	Lower California, N.W. Mexico.
solida, *Phil.*	subtriangularis, antice declivis, postice truncato-angulata, marg. ventr. minus arcuato; valde convexa.	liræ concentr. validæ, subæquales.	viridi-fusca, versus marginem sæpius læte viridis, nitida; intus pallide carnea vel pallide violacea.	subtumidi, acutiusculi, contigui, $\frac{1}{3}$–$\frac{2}{5}$.	obliquus, brevis, acutus.	40–42	37–38	$27\frac{1}{2}$–29	Brit. Honduras, Centr. & W. Nicaragua.
radiata, *Hanl.*	subtriangularis, antice declivis, postice truncato-angulata, marg. ventr. plus minusve arcuato.	,,	viridis vel viridi-fusca, viridi-radiata, nitida; intus violacea.	,,	,,	39–42	39-40	28–30	Brit. Honduras, W. Nicaragua.
placens, *Hanl.*	subtriangularis, antice declivis, postice angulato-producta, marg. ventr. paulum arcuato; valde convexa.	,,	viridi-fusca, unicolor, nitida; intus pallide violacea.	subtumidi, acuti, contigui, $\frac{2}{5}$.	obliquus, obtusus.	37–44	33–38	23–24	Honduras, E. Guatemala.
triangula, *Busch*	subæquilatero-triangularis, post. leviter convexa, marg. ventr. modice arcuato.	striæ concentr. debiles, inæquales.	olivacea vel virescens, opaca; intus albida, utrinque violascens.	subtumidi, acuti, contigui, $\frac{2}{5}$–$\frac{3}{7}$.	triangularis, parvus.	58–60	54–56	30	N.W. Mexico.
cordata, *Wiegm.*	triangularis, antice valde declivis, post. subproducta, marg. ventr. paulum arcuato; valde convexa.	striæ concentr. confertæ, subæquales.	obscure fusca, opaca; intus alba.	subtumidi, acuti, contigui, $\frac{1}{4}$.	angustus sat longus, valde obliquus.	48	44	33	Mexico.
pullastra, *Mörch*	suborbicularis, utrinque rotundata, antice multo brevior, marg. ventr. valde arcuato; subcompressa.	radiatim subtilissime striata.	?	subtumidi, acuti, contigui, $\frac{1}{3}$.	erectus, angustissimus.	$30\frac{1}{2}$	23	15	W. Nicaragua.
exquisita, *Prime*	"subquadrangularis, compressiuscula."	"striæ regularissimæ, approximatæ.'	olivaceo - fuscescens; intus purpurea.	"acuti, breves."	"profunde intrans."	24	22	12	S. Panama.
germana, *Prime*	"orbiculato-trigona, subæquilateralis, compressiuscula."	"striæ regulares."	olivaceo-lutescens; intus violacea.	"breves, incurvi."	,,	43	38	24	N.E. Mexico.
acuta, *Prime*	subtriangularis, ant. brevis, rotundata, post. rotundato-producta, marg. ventr. paulum arcuato; subcompressa.	striæ graves, regulares.	pallide fusca; intus salmonea vel intense violacea.	subtumidi, acuti, contigui, $\frac{2}{5}$.	angustus, curvatus, acutus.	41	36	22	?

sordida, *Hanl.*	subtriangularis, ant. brevis, subrotundata, post. sat declivis, subangulata, marg. ventr. sat arcuato; convexa.	concentrice rugulosa.	brunneo - olivacea, versus marginem virescens; intus albida.	subtumidi, acuti, contigui, $\frac{2}{5}$.	?	40	36	?	?
angulata, *Desh.*	"trigona, æquilateralis, post. angulata, subrostrata."	"lævigata."	sordide fuscescens; intus alba vel roseo tincta.	minimi, depressi.	?	34	30	20	?
II. Egeta, *H. & A. Adams.*									
mexicana, *Brod.*	ovato-triangularis, antice rotundato-subproducta, post. longe declivis, demum rotundata; marg. ventr. medio substricto; valde convexa.	striæ concentr. tenues, confertæ, inæquales.	obscure fusca, opaca; intus albida, ant. et post. paulum violacea.	tumidi, acutiusculi, contigui, $\frac{3}{8}$–$\frac{1}{3}$.	suberectus, angustus, obtusus.	32–51	25–41	22–28	Lower California, N.W. Mexico.
inflata, *Phil.*	ovato-triangularis, postice elongata, subtruncata, marg. ventr. parum arcuato; valde convexa.	striæ concentr. irregulares.	olivaceo - nigrescens; intus alba.	prominentes, lati, involuti.	?	62	58	46½	Costa Rica.
——, var. panamensis, *Desh.*	ovato-triangularis, postice sulco decurrente, subemarginata.	"breviter laminosa."	squalide fuscescens.	promine..tes, lati, involuti, $\frac{3}{7}$.	?	55–56	52–54	42	Panama.
——, var. cordiformis, *Récl.*	ovato-triangularis, postice sulco decurrente, angulatim emarginata.	"concentr. tenuiter striato-sulcata."	virenti-fusca; intus albida, post. ferrugineo-tincta.	prominentes, lati, involuti, $\frac{1}{3}$–$\frac{2}{5}$.	?	57–74	55–74	55	?
cumingi, *Desh.*	"ovato-subtrigona, ant. breviter rotundata, post. attenuata, declivis, demum truncata, angulo obtuso decurrente; tumida."	striæ concentr. tenuissimæ, inæquales.	fusco-virescens; intus candidissima.	magni, prominentes.	?	60	52	44	?
III. Cyrenocapsa, *Fisch.*									
maritima, *C. B. Ad.*	subtriangularis, antice breviter rotundata, post. longe declivis, subbiangulata, demum subtruncata, marg. ventr. sat arcuato.	striæ concentr. rudes, irregulares.	virescenti-fusca, detrita violascens; intus albida.	prominentes, acuti, contigui, non erosi, $\frac{2}{5}$.	indistinctus?	56	48	36	S. Panama.
salmacida, *Morel.*	oblongo-ovata, ant. rotundata, post. producta, subrostrata, marg. ventr. modice arcuato.	striæ concentr. tenues, irregulares.	albida, carnea vel zonis violaceis concentr. picta, periostraco non distincto; intus violascens.	parvi, minus prominentes, $\frac{1}{3}$–$\frac{2}{5}$.	brevis, late triangularis.	25–27	18–19	12–13	Yucatan.

Triangular, cordiform, dull yellowish-green; hinder area somewhat flattened, limited by a very obtuse keel; ventral margin strongly arcuated, slightly sinuated behind. Concentric ridges close together, flat, very unequal and some of them compound, somewhat wrinkled, particularly near the ventral margin. Hinder extremity subtruncated, there being a very obtuse angle near the hinder end of the lateral teeth and another much below at the junction with the ventral margin; ventral margin arcuated, slightly sinuated at its hinder end. Pallial sinus narrow, much ascending. Inside pale violet, with more intense violet zones.

a. Long. 54, alt. 45, diam. 30 millim. Vertices in $\frac{3}{8}$ long.
b. „ 62, „ 52, „ 34 „ „ $\frac{2}{5}$ „

a. Specimen in Dunker's collection; *b*. One in Paetel's collection.

Hab. N.W. Mexico: Mazatlan (*Reigen* [3–8]).

Central America, without nearer indication of locality (*Deshayes* [2]).

Also occurs in Lower California, at La Paz (*Major Rich* [5]).

A younger specimen, long. 35, alt. 30, diam. 19 millim., differs from the full-grown ones in having a more shining surface, and in the absence of any sinuation at the hinder end of the ventral margin; the hinder part of the shell is comparatively somewhat shorter, the summits, therefore, in two-fifths of the whole length.

In the example figured by Clessin [6] the ventral margin is more unequally arcuated, the sinus of the hinder part thus being more conspicuous than usual in this species.

Obs.—*P. fontainei*, d'Orb. [Voy. Am. mér. v. p. 569, t. 83. figg. 16, 17 (1835–43)], from Guayaquil, is more shining, with more regular, stronger, very close concentric ridges, the hinder extremity somewhat more produced and uni-angulated, the pallial sinus shorter and more oblique.

2. **Polymesoda solida.** (Tab. XLII. figg. 8, 8 *a*, 9, 9 *a*.)

Cyrena solida, Philippi, Abbild. neuer Conch. ii. p. 78, t. 1. fig. 9 (Feb. 1846) [1]; Deshayes, Catal. Conchifera Brit. Mus. ii. p. 254 [2]; Prime, Monogr. Am. Corbiculadæ, p. 14, fig. 8 [3]; Clessin, in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, *Cycladeen*, p. 109, t. 13. figg. 7–9 [4]; Tate, in Am. Journ. of Conch. v. p. 160 (1870) [5] [nec *C. solida*, Dunker, Ueber die norddeutschen Wälderthone, p. 23 (1843–44); Monogr. der norddeutschen Wealdenbildungen, p. 31, t. 10. fig. 20 (1846, not 1834 as stated by Fischer [7]); nec *C. solida*, Sowerby, in Reeve's Conch. Icon. xx., *Cyrena*, t. 18. fig. 104, from Australia (1876)].

Cyrena nicaraguana, Prime, Am. Journ. of Conch. v. p. 146 (1869) [6]; Fisch. & Crosse, Miss. Scient. Mex., Moll. ii. p. 640, t. 64. figg. 2 (?), 2 *a*, 3 [7].

Polymesoda, sp. indet., Mörch, in Malak. Blätt. vii. p. 193 (1860–61) [8].

Unequilaterally triangular, very swollen, fore side shortly rounded, hinder side much descending above, bluntly angulated in its lower part, without a distinct ridge limiting the posterior area; ventral margin strongly arcuated. Outside somewhat silky in appearance, shining, dark greenish-brown, near the ventral margin often light green; concentric ridges strong, most of them regular, a few bifurcating or anastomosing. Inside more or less violet or pale reddish, adductor impressions darker violet; pallial sinus diagonally oblique, rather short, triangular.

a. Long. 40, alt. 38, diam. 28 millim. Vertices in $\frac{1}{3}$ long.
b. „ 42, „ 38, „ $27\frac{1}{2}$ „ „ $\frac{3}{8}$ „
c. „ 41, „ 37, „ 29 „ „ $\frac{2}{5}$ „

a. Figure given by Philippi; *b*, *c*. Specimens from Nicaragua in Dunker's collection.

Hab. British Honduras: Belize (*Prime* [3]).

Central Nicaragua: Lake of Nicaragua [1].

W. Nicaragua: Greytown (San Juan del Norte), with *Neritina virginea*, in brackish-water pools, burrowing to a depth of one or two inches in the sandy bottom (*Tate* [5]).

The figures given by Clessin [4] and Fischer and Crosse (fig. 2) [7] do not agree very well with the two specimens from Nicaragua in Dunker's collection shown on our Plate (probably given by Philippi); the former is too much rounded, especially in the fore part, the latter is too much produced in the fore part and has a distinct angular ridge limiting the posterior area; moreover, in these figures the pallial sinus is too horizontal. Fischer and Crosse's fig. 2 *a*, dorsal view, on the contrary, agrees very well with the above-mentioned Nicaraguan examples.

Dr. Mörch's unnamed species [8] appears to be very like the specimens in Dunker's collection. Obsolete radial furrows inside the ventral margin are more or less distinctly expressed in all examples of *Polymesoda*; they are not, therefore, of specific importance.

3. **Polymesoda radiata.**

Cyrena radiata, Hanley, P. Z. S. 1844, p. 159 [1]; Deshayes, Cat. Conchifera Brit. Mus. ii. p. 254 [2]; Prime, Monogr. Am. Corbiculadæ, p. 13, fig. 7 [3]; Clessin, in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, *Cycladea*, p. 118, t. 22. figg. 1, 2 [4].

? *Cyrena radiata*, Sowerby, in Reeve's Conch. Icon. xx., *Cyrena*, t. 13. fig. 47 [5] [nec *Cyrena radiata*, Parreyss, Philippi (1846) (*Corbicula*)].

Cyrena nicaraguana, var. *β. radiata*, Fisch. & Crosse, Miss. Scient. Mex., Moll. ii. pp. 540, 541 [6].

Differs from the preceding in having some rather broad green rays. Some specimens are more compressed, and more intensely violet inside; moreover, the anterior dorsal margin descends a little more deeply and the anterior lateral teeth are correspondingly longer than in *P. solida*. Sculpture and pallial sinus similar.

a. Long. 42, alt. 40, diam. 30 millim. Vertices in $\frac{2}{5}$ long.
b. „ 39, „ 39, „ 29 „ „ $\frac{2}{5}$ „
c. „ 42, „ 39, „ 28 „ „ $\frac{1}{3}$ „

a, *b*. Specimens in the Berlin Museum; *c*. Measurements given by Prime [3].

Hab. British Honduras: Belize (*Bocourt* [6]).

W. Nicaragua: Realejo (*Prime* [3]).

Hanley [1] merely gives Central America as locality.

4. **Polymesoda placens.** (Tab. XLII. figg. 4, 4 *a*, *b*, 5, 5 *a*, *b*.)

Cyrena placens, Hanley, P. Z. S. 1844, p. 160 [1]; Catal. Recent Bivalv. p. 352, t. 14. fig. 52 [2]; Prime, Monogr. Am. Corbiculadæ, p. 20 [3] [nec *C. placida*, Deshayes (1854); Sowerby, in Reeve's Conch. Icon., *Cyrena*, t. 18. fig. 106].

Cyrena solida (Phil.), Stoll, Guatemala Reisen und Schilderungen, 1886, p. 472 [4].

Triangular, shining, dark brownish-green, with strong, close, regular concentric ridges; ventral margin more

arcuated before than behind. Inside pale violet or salmon-coloured in the middle, pale violet near the margins; pallial sinus diagonally ascending, not very narrow, obtuse at the upper end, yellowish-green.

a. Long. 44, alt. 38, diam. ? millim. Vertices in $\frac{2}{5}$ long.
b. „ 43, „ 37, „ 29 „ „ $\frac{2}{5}$ „
c. „ 40, „ 33, „ 42 „ „ $\frac{2}{5}$ „

a. Hanley's measurements and figure; *b*, *c*. Stoll's specimens.

Hab. Honduras [1–3].

E. Guatemala, Livingston, in the Gulf of Honduras (*Stoll* [4]).

Carpenter (Catal. Mazatlan Shells, p. 114) thinks that this species may be identical with *C. fontainei*, d'Orb.; and Prime [3] says "I have reason to believe that *P. placens* is closely allied to *C. fontainei*."

5. **Polymesoda triangula.**

Cyrena triangula, von dem Busch, in Philippi's Abbild. neuer Conch. iii. p. 78, t. 2. fig. 3 (1849) [1]; Deshayes, Catal. Conchifera Brit. Mus. ii. p. 253 [2]; Prime, Monogr. Am. Corbiculadæ, pp. 14, 23 [3]; Clessin, in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, Cycladeen, p. 112, t. 14. fig. 1 [4]; Fisch. & Crosse, Miss. Scient. Mex., Moll. ii. p. 635, t. 70. figg. 6, 6 *a*, *b* [5].

Cyrena altilis, A. Gould, Boston Journ. of Nat. Hist. vi. p. 400, t. 16. fig. 5 *bis* (1852–53) [6].

Cyrena mexicana, var. *altilis* (A. Gould), Carpenter, P. Z. S. 1856, p. 202 [7].

Cyrena mexicana (Brod., Sow.) a very extreme form, Mr. Darbishire's specim., Carpenter, Cat. Mazatlan Shells, p. 116 [8].

Almost equilaterally triangular, and nearly as high as long; posterior dorsal margin slightly convex; ventral margin moderately excavated.

Long. 58–60, alt. 54–56, diam. 30 millim. Vertices in $\frac{2}{5}$–$\frac{3}{7}$ long.

Hab. N.W. Mexico: Mazatlan, in abundance (*Reigen* [7], *Jewett* [6]).

The habitat of the typical specimens [1] is not known. Clessin [4] mentions also "Zampico" as a locality for this species, probably a misprint for Tampico, in N.E. Mexico; but I can find no authority for this statement. *P. triangula* must not be confounded with *Cyrena triangularis*, Metcalfe (1851), from Borneo.

6. **Polymesoda cordata.** (Tab. XLII. figg. 7, 7 *a*, *b*.)

Cyrena cordata (Wiegmann, in Mus. Berol.), v. Mart. Malak. Blätt. xii. p. 69 (1865) [1]; Fisch. & Crosse, Miss. Scient. Mex., Moll. ii. p. 639 [2].

Near the preceding, but more unequilateral; the anterior side descending very steeply, the posterior side more convex. Dark brown, with close concentric striæ; inside white (bleached?). Pallial sinus rather narrow and long, very oblique.

Long. 48, alt. 44, diam. 33 millim. Vertices in $\frac{1}{4}$ long.

Hab. Mexico: without nearer indication of locality (*Deppe* [1 2]).

Deppe collected at Vera Cruz, Jalapa, Mexico city, and Monterey; it cannot, therefore, be decided as to which region of Mexico this species belongs.

[Known South of Vera Cruz by later collections ! H.E.]

Species imperfectly known, but with precise localities.

7. Polymesoda pullastra.

Polymesoda (*Egetaria*) *pullastra*, Mörch, in Malak. Blätt. vii. p. 194 (1860–61) [1].
Cyrena pullastra, Prime, Monogr. Am. Corbiculadæ, p. 26; Bull. Mus. Comp. Zool. v. p. 43, t. 2. figg. 3 *a*, *b*, *c* (1878) [2].

Very unequilateral, rounded before and behind, ventral margin much arcuated.
Long. 30, alt. 23, diam. 15 millim. Vertices in $\frac{1}{3}$ long.

Hab. W. Nicaragua: Realejo (*Ærsted* [1 2]).

The typical specimen in the Museum at Copenhagen, figured by Prime, is very worn; no other is known.

8. Polymesoda exquisita.

Cyrena exquisita, Prime, Ann. Lyc. New York, viii. p. 417 (1867) [1].

Long. 24, alt. 22, diam. 12 millim.

Hab. S. Panama: Rio Chepo [1].

9. Polymesoda germana.

Cyrena germana, Prime, Ann. Lyc. New York, viii. p. 415 (1867) [1].

Long. 43, alt. 38, diam. 24 millim.

Hab. N.E. Mexico: Rio Panuco, near Tampico [1].

Species of uncertain origin, but recorded as from Central America.

10. Polymesoda acuta.

Cyrena acuta, Prime, Journ. de Conch. ix. p. 355 (1861) [1]; x. p. 387, t. 14. fig. 1 (1862) [2]; Monogr. Am. Corbiculadæ, pp. 21, 22, fig. 17 [3] [nec *C. acuta*, R. Ludwig, Palæontographica, viii. p. 197 (1861), = *Corbicula faujasi*, Desh., a Miocene fossil species].

Hab. Central America, without nearer indication of locality (*Prime* [1–3]).

Very near *P. placens*, but apparently with a distinct angular line descending from the summits backward to the hinder end of the ventral margin; the pallial sinus, too, is described as being "narrow, curved, and acute at extremity."

11. Polymesoda sordida.

Cyrena sordida, Hanley, P. Z. S. 1844, p. 159 [1]; Catal. Rec. Bivalv. p. 352, t. 14. fig. 51 [2]; Deshayes, Catal. Conchifera Brit. Mus. ii. p. 255 [3]; Prime, Monogr. Am. Corbiculadæ, p. 13 [4].

Hab. North America [1].

? Central America [4].

Hanley says that this species is intermediate between *P. carolinensis* and *P. radiata*, having the membranous wrinkles of the former, the general outlines of the latter.

Prime [4] "could not identify it," but states "Central America (cabinet of Hanley)"; if this statement is correct, Hanley must have obtained information as to locality after his description was published.

12. **Polymesoda angulata.**

Cyrena angulata, Deshayes, P. Z. S. 1854, p. 22 [1]; Catal. Conchifera Brit. Mus. ii. p. 259 [2].

Cyrena tumida, Prime, Monogr. Am. Corbiculadæ, p. 26 (1865) [3].

Long. 34, alt. 30, diam. 20 millim.

Hab. Central America, without nearer indication of locality (*Cuming* [3]).

Prime [3] says that the name *angulata* is preoccupied; he does not, however, mention any other species of this name in his 'Catalogue of the Recent and Fossil Species of *Cyrena*' (1863), nor in that published in 1869 (Am. Journ. Conch. v.).

II. Egeta, H. & A. Adams.

13. **Polymesoda mexicana.** (Tab. XLII. figg. 1, 1 *a*, 2, 2 *a*, *b*, 3, 3 *a*.)

Cyrena mexicana, Broderip & Sowerby, Zool. Journ. iv. p. 364 (1828–29) [1]; Hanley, Catal. Rec. Bivalv. p. 94 [2]; Carpenter, Cat. Mazatlan Shells, p. 115 (part.) [3]; Mollusks of W. N. America, p. 27 (1872) [4]; Prime, Monogr. Am. Corbiculadæ, p. 22, fig. 18 [5]; Clessin, in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, Cycladeen, p. 119, t. 22. figg. 3, 4 [6]; Sowerby, in Reeve's Conch. Icon. xx., *Cyrena*, t. 19. fig. 110 [7]; Fisch. & Crosse, Miss. Scient. Mex., Moll. ii. p. 637, t. 70. figg. 7, 7 *a*, *b* [8].

Cyrena floridana (part.), Deshayes, Catal. Conchifera Brit. Mus. ii. p. 257 [9].

Very unequilateral, the hinder part produced, but rounded in its lower half, much swollen, summit very prominent, ventral margin nearly straight at the middle. Concentric ridges close together, fine, not wrinkled. Inside white, violet only near the anterior and posterior margins. Pallial sinus narrow, much ascending.

a.	Long. $51\frac{1}{2}$,	alt. 41,	diam. 28 millim.		Vertices in $\frac{3}{8}$	long.
b.	„ $38\frac{1}{2}$,	„ $32\frac{4}{5}$,	„ 24	„	„ ?	„
c.	„ 36,	„ 29,	„ $24\frac{1}{2}$	„	„ $\frac{1}{3}$	„
d.	„ 32,	„ 25,	„ 22	„	„ $\frac{1}{3}$	„

a. Specimen from Mazatlan in Dunker's collection; *b*. Measurements given by Broderip and Sowerby, reduced to millimetres; *c*. Figure given by Clessin; *d*, by Fischer and Crosse.

Hab. N.W. Mexico: Mazatlan (*Beechey* [1]; *Reigen*; *Deshayes* [9]; *Forrer, in coll. Dunker*).

Also in Lower California, at La Paz (*Major Rich* [4]).

The fore part is more obtuse and descending in Fischer and Crosse's figure [8], more fully rounded in that given by Clessin [6]. Among the four specimens now before me,

two from Dunker's collection (figg. 2, 2 *a*, *b*) agree with Fischer and Crosse's figure, the large one (*a*) with Clessin's, and one, from Paetel's collection, is intermediate between them in the outlines of the fore part, but in size like *d*. Our figures 1 and 3 show the amount of variation in somewhat younger examples of equal size.

Very young specimens are quite globose, and they somewhat resemble, externally, *Corbicula convexa*, Desh., according to Prime [5]. This author mentions also Panama as a locality for this species; but, as he gives no information concerning the collector, this statement seems to require confirmation.

Cyrena æquilatera, Deshayes, P. Z. S. 1854, p. 20 (*C. æquilateralis*, Deshayes, Catal. Conchifera Brit. Mus. ii. p. 255), is quoted by Clessin [6] and Fischer and Crosse [8] as a synonym of *P. mexicana*; this shell, however, is from Cayenne, and the description, especially "testa æquilaterali, lateribus subæqualibus," does not agree at all with *C. mexicana*. Sowerby, in Reeve's Conch. Icon. xx., *Cyrena*, t. 19. fig. 114, figures for it a very unequilateral shell, with the summits in two-fifths of the length.

14. **Polymesoda inflata.**

Cyrena inflata, Philippi, Zeitschrift f. Malak. 1851, p. 71 [1]; Prime, Monogr. Am. Corbiculadæ, p. 26 (copied from Philippi) [2].

Ovate-triangular, very swollen, rather thin, with irregular concentric striæ, dark greenish; summits very prominent, rolled-up, decorticated; ventral margin little arcuated.

Long. 62, alt. 58, diam. 46½ millim.

Hab. Costa Rica [1].

According to Philippi, this shell externally resembles *Isocardia cor*, L.

Var. *panamensis*.

Cyrena inflata, Deshayes, P. Z. S. 1854, p. 23 [3]; Catal. Conchifera Brit. Mus. ii. p. 260 [4].

Cyrena panamensis, Prime, Proc. Acad. Phil. 1860, p. 283 [5]; Monogr. Am. Corbiculadæ, p. 24 [6]; Sowerby, in Reeve's Conch. Icon. xx., *Cyrena*, t. 8. fig. 29 [7].

Seems to differ from *P. inflata* in having a distinct furrow descending from the summits towards behind and below.

a. Long. 55, alt. 52, diam. 42 millim. (Prime [6].)

b. „ 56, „ 54, „ ? „ Vertices in ⅗ long. (Sowerby's figure).

Hab. Panama [3–5].

Var. *cordiformis*.

Cyrena cordiformis, Récluz, Journ. de Conch. iv. p. 251, t. 7. fig. 9 (1853) [8].

Cyrena recluzi, Prime, Monogr. Am. Corbiculadæ, p. 24, fig. 24 [9].

Cyrena maritima (C. B. Adams), Sowerby, in Reeve's Conch. Icon. xx., *Cyrena*, t. 8. fig. 30 [10].

Also with a hinder furrow, but more sharply angulated at the hinder margin below this furrow.

a. Long. 74, alt. 74, diam. 55 millim. Vertices in ⅖ long. (Récluz [8]).

b. „ 57, „ 55, „ 29 „ „ ⅓ „ (Sowerby's figure).

Hab. ? CENTRAL AMERICA.

No locality is indicated for the typical specimen, but Prime [9] says that he is satisfied on careful inspection that it comes from Central America!

15. **Polymesoda cumingi.**

Cyrena cumingii, Deshayes, P. Z. S. 1854, p. 22 [1]; Catal. Conchifera Brit. Mus. ii. p. 257; Prime, Monogr. Am. Corbiculadæ, p. 25 [3] (probably not *C. cumingi*, Sowerby, in Reeve's Conch. Icon. xx., *Cyrena*, t. 12. fig. 53).

Long. 60, alt. 52, diam. 44 millim.

Hab. CENTRAL AMERICA, without nearer indication of locality (*Cuming* [1–3]).

The shell figured by Sowerby under this name is much smaller and said to come from the Philippines.

NEOCORBICULA.

Neocorbicula, Fischer, Manuel de Conch. p. 1092 (1887).

Three converging cardinal teeth on each valve; anterior and posterior lateral teeth about equally long, furrowed transversely. A small pallial sinus. Shell generally of smaller size than that of *Cyrena* and *Polymesoda*.

This genus differs from *Corbicula*, of the Eastern Hemisphere, by the presence of a pallial sinus, a character also separating *Polymesoda* from *Cyrena*. The lateral teeth are serrated in *Corbicula* and *Neocorbicula*, and smooth in *Cyrena* and *Polymesoda*, one of the genera in each case being Eastern and the other American. *Neocorbicula* is represented by several species in South America, ranging from Venezuela to Argentina, but is absent from North America and the West Indian Islands; the occurrence of one species in Mexico is open to doubt.

1. **Neocorbicula convexa.**

Corbicula convexa, Deshayes, P. Z. S. 1854, p. 342 [1]; Catal. Conchif. Brit. Mus. ii. p. 231 [2]; Carpenter, in Report Brit. Assoc. Advanc. of Science for 1863, p. 668, =Mollusks of W. N. America, p. 154 (1872) [3]; Prime, Monogr. Am. Corbiculadæ, p. 3, fig. 1 [4]; Clessin, in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, Cycladeen, p. 204 [5]; Fischer & Crosse, Miss. Scient. Mex., Moll. ii. p. 628, t. 70. figg. 8, 8 *a*, *b* [6].

Corbicula ventricosa, Prime, in litt. (before 1865) [7].

Rounded-triangular, rather swollen, with irregular delicate concentric striæ, light green, inside white. Pallial sinus small, triangular.

a. Long. 18, alt. 16, diam. 13 millim. Vertices in $\frac{2}{5}$ long.
b. „ $14\frac{1}{2}$, „ 14, „ 10 „ „ in nearly $\frac{1}{2}$ long.

a. Prime's figure [4]; *b*. Fischer and Crosse's measurements and figure [6], taken from a specimen in Deshayes's collection.

Hab. ? N.W. MEXICO: Mazatlan (*Prime* [4 7]).

S.W. MEXICO: Acapulco, one worn valve (*Dr. Newberry* [3]).

Deshayes[1 2] states that it is found in the rivers of Central America, without mentioning any definite locality; but in his collection the specimens are labelled Rio de la Plata, according to Fischer and Crosse[6].

Prime[4] states that *N. convexa* differs from all other species of the genus by its globular shape; externally it somewhat resembles the young of *Cyrena mexicana*. Is it possible that in very young examples of *Polymesoda* the lateral teeth also are transversely furrowed?

SPHÆRIUM.

Sphærium, Scopoli, Introd. Hist. Nat. p. 397 (1777) [re-introduced by Gray, P. Z. S. 1847, p. 184].
Cyclas, Bruguière, Encycl. Méth., Vers, i. p. 536 (1792) [restricted by C. Pfeiffer, Naturg. Deutsch. Land- und Süssw.-Moll. i. p. 119 (1821)].

Shell nearly globular, rounded before and behind, summits not far from the middle of the length; two cardinal teeth in the left valve, one or two in the right, anterior and posterior lateral teeth present, somewhat elongated. No pallial sinus. Two siphons of unequal length, united at the base.

Generally distributed, chiefly in the temperate zones, in stagnant water; viviparous.

1. Sphærium triangulare.

Cyclas triangularis, Say, in New Harmony Disseminator of Useful Knowledge, 1829, p. 356[1].
Sphærium triangulare, Prime, Monogr. Am. Corbiculadæ, p. 36, fig. 28[2]; Clessin, in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, Cycladeen, p. 99, t. 12. fig. 8 (not very exactly copied from Prime)[3]; Fisch. & Crosse, Miss. Scient. Mex., Moll. ii. p. 651[4].

Ovate-orbicular, nearly equilateral, summits prominent, fore part produced and somewhat narrowed, hinder part shortly rounded.
Long. $12\frac{1}{2}$–$13\frac{1}{2}$, alt. 10–$10\frac{1}{2}$, diam. 3 millim. Vertices in about $\frac{1}{2}$ long.

Hab. Mexico (*Say*[1–4]).

2. Sphærium subtransversum.

Sphærium subtransversum, Prime, P. Z. S. 1860, p. 322[1]; Monogr. Am. Corbiculadæ, p. 52[2]; Sowerby, in Reeve's Conch. Icon. xx., *Sphærium*, t. 4. fig. 38[3]; Fisch. & Crosse, Miss. Scient. Mex., Moll. ii. p. 652, t. 69. figg. 5, 5 *a*[4].

Nearly equilateral, rounded before and behind, somewhat shorter before; summits a little prominent, ventral margin arcuated.
Long. $10\frac{1}{2}$–13, alt. $8\frac{1}{2}$–10, diam. 6–7 millim. Vertices in $\frac{3}{7}$ long.

Hab. Central Mexico: near the town of Mexico (*Boucard*[4]).
E. Mexico: Rio del Digue, near Jalapa (*Strebel*); Jalapa (*Höge*; *F. D. Godman*, Feb. 1888); Cordova (*Höge*).
S.E. Mexico: Tabasco (*coll. Cuming*[1 2 3]).

3. **Sphærium martensi.** (Tab. XLIII. figg. 3, 3 *a*, *b*.)

Sphærium martensi, Pilsbry, Proc. Acad. Phil. 1899, p. 401 [1].

Rather large and fragile, in general outline like the preceding, but with broader summits and much thinner teeth. Summits somewhat swollen, but not distinctly circumscribed as in the subgenus *Calyculina*.

Long. 15½, alt. 11, diam. 7½ millim.

Hab. Central Mexico: Tzintzuntzan, Lake Patzcuaro, State of Michoacan (*Mr. & Mrs. S. N. Rhoads* [1]).

4. **Sphærium luridum,** sp. n. (Tab. XLIII. figg. 2, 2 *a*, *b*, *c*.)

Transversely oval, distinctly unequilateral, solid, moderately convex; beaks full, obtuse, scarcely raised above the outline of the shell, decorticated; anterior part broadly rounded, posterior lower and subangular; ventral margin very slightly arcuated in the middle part, more ascending before than behind; outside with regular close-set concentric ridges, dull yellowish-brown, not shining; hinge-margin thin, cardinal teeth feeble, anterior lateral tooth rather strong, but short, distinctly curved, posterior lateral tooth thinner and longer; inside white or pale grey.

Long. 9–10, alt. 7, diam. 4½–5 millim. Vertices in ⅖ long.

Hab. N.W. Mexico: Ameca, State of Jalisco (*Richardson*).

Near *S. sulcatum*, Lam. (*simile*, Say), and *S. aureum*, Prime, from North America, but of smaller size and with more curved hinge-margin than the former, comparatively more oblong, with the summits not so prominent and the ventral margin less arcuated than the latter, besides being somewhat more unequilateral than both.

Younger specimens are also a little more equilateral and more orbicular than the full-grown ones, viz.:—Long. 6½, alt. 5, diam. 3½ millim.; vertices in ⅜ long.

The very young examples which are found within the shell of the parent animal measure 2·6 millim. in length, 2·1 in height, and 0·6 in diameter (see fig. 2 *c*).

5. **Sphærium costaricanum,** sp. n. (Tab. XLIII. figg. 1, 1 *a*, *b*.)

Testa parva, subæquilatera, modice convexa, striis concentricis tenuibus sculpta, pallide grisea, zona marginali flava, antice breviter rotundata, postice subrostrata, margine dorsali antrorsum et retrorsum declivi, marg. ventrali sat arcuato; verticibus vix prominulis, rubescentibus.

a.	Long.	4·8,	alt.	4·0,	diam.	2·5	millim.	Vertices in	⅓ long.
b.	„	4·5,	„	3·5,	„	2·3	„	„	2/7 „
c.	„	4·1,	„	3·5,	„	1·7	„	„	¼ „
d.	„	4·0,	„	3·3,	„	2·0	„	„	⅓ „
e.	„	3·1,	„	2·6,	„	1·45	„	„	⅓ „

a. Specimen from Alajuela; *b*–*e*. Specimens from La Palma.

Hab. Central Costa Rica: La Palma, alt. 1500–1600 metres, in swamps (*Biolley & Pittier*); Alajuela, alt. 900–1000 metres (*Orosco*).

EUPERA.

Eupera, Bourguignat, Amenités Malac. i. pp. 30, 61 (1854).
Limosina, Clessin, Malak. Blätt. xix. p. 160 (1871).

Shell of small size, the part before the summits shorter and lower than that behind them; in each valve one cardinal tooth only; anterior and posterior lateral tooth

moderately long, smooth. No pallial sinus. Often marked with dark spots, which are visible on the outside and on the inside of the shell. Two long siphons, united at the base.

Inhabits Central and South America, including the West-Indian Islands; and also Tropical Africa.

1. **Eupera maculata.**

Cyclas maculata, Morelet, Test. Noviss. ii. p. 25 (1859) [1] (nec *C. maculata*, Anton, Verzeichniss d. Conchyl. 1839, p. 14).

Sphærium maculatum, H. & A. Adams, Gen. Recent Moll. ii. p. 450 [2]; Prime, Monogr. Am. Corbiculadæ, p. 55, fig. 55 [3]; Sowerby, in Reeve's Conch. Icon. xx., *Sphærium*, t. 3. fig. 21 [4].

Limosina maculata, Clessin, in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, Cycladeen, p. 249, t. 46. fig. 12 (copied from Prime) [5].

Sphærium yucatanense, Fisch. & Crosse, Miss. Scient. Mex., Moll. ii. p. 653, t. 63. figg. 1, 1 *a*, t. 64. figg. 1, 1 *a*, *b* [6].

Obovate, minutely lamellose-striate, brown, with darker spots.
Long. 10, alt. 7, diam. 5 millim. Vertices in $\frac{2}{5}$ long.

Hab. YUCATAN, in marshes (*Morelet* [1]).

Fischer and Crosse [6] changed Morelet's name because there was another *Cyclas maculata* (E. Anton, 1839), which belongs to the same subdivision of the genus; but, as this latter is regarded by most authors as a synonym of the older *Cyclas bahiensis*, Spix, Test. Fluv. Brasil. 1827, p. 32, I think Morelet's name of the species can be maintained until the distinctness of Anton's is proved.

2. **Eupera meridionalis.**

Sphærium meridionale, Prime, Proc. Acad. Phil. 1861, p. 416 [1]; Monogr. Am. Corbiculadæ, p. 55, fig. 54 [2].

Limosina meridionalis, Clessin, in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, Cycladeen, p. 249, t. 46. fig. 11 [3].

"Compared with the preceding (*S. maculatum*) it is larger, its posterior margin is less abrupt, and its lateral teeth are larger." (*Prime* [2].)

Hab. S. PANAMA: Panama (*Prime* [1–3]).

3. **Eupera pittieri,** sp. n. (Tab. XLIII. figg. 4, 4 *a*, *b*.)

Testa oblongo-obovata, sat compressa, non nitida, sulcis concentricis subdistantibus sculpta, flavido-fusca, non maculata, vertice rufescente, antice late rotundata, postice rotundato-subtruncata, margine dorsali postico primum ascendente, dein valde descendente, margine ventrali paulum arcuato; facies interna pallide violacea, margine cardinali anteriore ante vertices declivi, pone vertices subrecto, dentibus cardinalibus minimis, lateralibus sat validis.
Long. 4·6, alt. 3·4, diam. 2 millim. Vertices in $\frac{1}{3}$ long.

Hab. S.W. COSTA RICA: Sierpe, in swamps, on aquatic plants, at an elevation of 5 metres above the sea (*Pittier*, April 1892).

PISIDIUM.

Pisidium, C. Pfeiffer, Syst. Anordn. u. Beschr. d. deutsch. Land- u. Wasser-Schneck. i. p. 123 (1821).
Pisum (nec Megerle, 1811), Gray, P. Z. S. 1847, p. 184.
Musculium (nec Link, 1807), H. & A. Adams, Gen. Recent Moll. ii. p. 451 (*cf.* p. 660, 1858).

Fore part of the shell (before the summits) distinctly longer than the hinder part, which bears the ligament. Two small cardinal teeth in the left valve, two (or one) in the right. No pallial sinus. Of small size, more or less triangular or globular. Two very short siphons.

Generally distributed.

1. **Pisidium abditum.** (Tab. XLIII. figg. 5, 5 *a*, *b*.)

Pisidium abditum, Haldeman, Proc. Acad. Phil. i. p. 53 (1841)[1]; Deshayes, Catal. Conch. Brit. Mus. ii. p. 281[2]; Prime, Monogr. Am. Corbiculadæ, p. 68, fig. 72 (magnified)[3].
Pisidium retusum, Prime, P. Z. S. 1860, p. 322[4]; Catal. Rec. Species Fam. Corbiculadæ, in Am. Journ. Conchol. v. 2, p. 172 (1869)[5].

"Testa minuta, ovata, subrhomboidea, complanata, inæquilaterali, tumida, postice rotundata, tenuiter striata, epidermide corneo-flava vestita, umbonibus tumidis." (*Prime*[4].)

a. Long. $3\frac{4}{5}$, alt. $3\frac{1}{2}$, diam. $2\frac{1}{4}$ millim. Vertices in $\frac{3}{5}$ long.
b. „ $5\frac{1}{2}$, „ 4·6, „ 3·3 „ „ $\frac{8}{11}$ „

a. Measurements given by Prime for *P. abditum*; *b*. Specimen from Cartago.

Hab. Honduras (*coll. Cuming*[4]).

Central Costa Rica: San José, 1135 metres (*Biolley*); Rio Torres, below San Francisco; San Francisco, 1100 metres (*Pittier*); Cartago (*Aug. Müller*).

Also recorded from San Rafael, New Mexico [Dall, Proc. U.S. Nat. Mus. xix. p. 370 (1896)].

Prime first[4] described the specimens from Honduras as a separate species, but afterwards, in 1865[3], he unites them with *P. abditum*, without distinguishing the Honduras examples even as a "variety"; but, in 1869[5], he again maintains the latter as distinct. It is unnecessary to quote here the full synonymy of *P. abditum*, as it refers to specimens from North-American localities only, extending northwards as far as Lake Superior, New England, and Montreal. The above diagnosis is taken from Prime's description of the Honduras examples; but as no measurements are given, they must be compiled from the general descriptions of the North-American *P. abditum*. Clessin remarks that this species is the American analogue of *P. fossarinum* (*fontinale*, C. Pfr., part.), which is rather widely distributed in Northern and Middle Europe.

The Berlin Museum has received from the dealer, Aug. Müller, some specimens of a *Pisidium*, labelled "Cartago, Costa Rica," which agree very well with Prime's description and figure, except in their larger size (see measurements *b*).

It may be remarked that the figure given by Clessin, in Martini and Chemnitz, Conch.-Cab. ed. 2, Cycladeen, t. 6. figg. 7–9, differs in its outlines considerably from

that given by Prime [3]; Binney's figure in the second edition of A. Gould's 'Report of the Invertebrata of Massachusetts,' p. 113, fig. 125, is a copy of that given by Prime.

Similar small shells were collected by B. Biolley at San José, Central Costa Rica, 1135 metres above the sea.

2. Pisidium singleyi.

Pisidium singleyi, Sterki, Nautilus, xi. p. 112 (1898) [1].

In shape and colour resembling *P. punctatum*; the surface very finely, almost regularly striated, somewhat shining; interior surface with fine but well-marked crowded pits, visible from the outside; hinge rather fine.

Long. 3·3, alt. 2·8, diam. 2·4 millim.

Hab. N.W. Mexico: Itzlan Creek, Guadalajara [1]. Also in the Guadaloupe River, Texas [1].

C. *SPECIES SUBMARINÆ**.

Under this heading I place the Mollusca that live on or near the sea-shore; their chief haunts are the mangrove-swamps (Auriculidæ, Potamides, and some Littorinæ), or the rocks near and above high-water mark (some Auriculidæ and Littorinæ).

Fam. AURICULIDÆ.

Air-breathing Gastropods with only two feelers, the eyes at or behind their base; sexes united; radula with numerous teeth, somewhat like those of the Helicidæ, but in waved transverse rows. An outer shell, protecting the whole animal; no operculum. Shell spiral, solid; aperture longitudinal, its margins mostly thickened and often provided with teeth or plaits; a columellar plait (fold) always present at the base of the wall of the aperture, opposite the outer margin.

The species of this family are characteristic submarine forms, most of them (the genus *Carychium* and some others excepted) living in estuaries or in places reached by the tide.

AURICULA.

Auricula, Lamarck, in Mém. Soc. d'Hist. Nat. de Paris, 1799, p. 76; Syst. des Animaux sans Vert. p. 92 (1801); Pfeiffer, Monogr. Auric. p. 123; Catal. Auric. Brit. Mus. p. 93; v. Martens, in M. Weber's Zoologische Ergebnisse einer Reise in Niederländisch Ostindien, iv. pp. 149, 150 (1897) (part.).

Auriculus, Montfort (1810); Pfeiffer (1876).

Ellobium, C. Botten (1798); H. & A. Adams, Gen. Rec. Moll. p. 237 (1858).

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* See pp. 1, 353.

Shell of rather large size, cylindrico-oval, more or less granulated, with brownish periostracum; aperture oblong, with a strong columellar fold and 1–2 parietal folds; outer margin of the aperture thickened, but not expanded.

In the typical species of *Auricula*, *A. midæ* and *A. judæ*, L., of the Malayan Archipelago, the feelers are terminated by a conical smooth swelling, well distinct from the rest of the feelers, and the eyes are situated within the bases of the feelers, not behind them on the surface of the head (see Lesson, in Duperey's Voy. de Coquille, Zool. ii. p. 337, t. 9. figg. 1 A–C; Souleyet, Voy. de la Bonité, Zool. ii. p. 515, t. 29. figg. 19, 20; v. Martens, Malak. Blätt. x. p. 126; and in Weber's work quoted above, p. 150, t. 8. figg. 6, 6 *a*). *A. stagnalis* and the other American forms have, however, not yet been observed during life and it remains doubtful whether they really pertain to this genus.

The typical Malayan species live on muddy ground at the mouths of rivers and among mangroves, partly buried in the ground or even in rotten wood.

1. **Auricula (?) stagnalis.**

Auricula stagnalis, d'Orbigny, in Guérin's Mag. Zool. 1835, p. 23 [1]; Voy. Amér. mérid., Moll. p. 325, t. 42. figg. 7, 8 [2]; Reeve, Conch. Syst. ii. p. 106, t. 187. fig. 9 [3]; Conch. Icon. xx., *Auricula*, t. 2. fig. 3 [4]; C. B. Adams, Ann. Lyc. Nat. Hist. N. York, v. p. 434 (1852) [5]; Pfeiffer, Monogr. Auric. p. 133 [6]; Catal. Auric. Brit. Mus. p. 101 [7].

Auricula papillifera, Küster, in Martini & Chemnitz's Syst. Conch.-Cab. ed. 2, Auriculaceen, p. 25, t. 3. figg. 9, 10 (1844) [8].

Ellobium papilliferum, Mörch, Malak. Blätt. vi. p. 116 (1860) [9].

Elliptical, finely granulated, yellowish, with two parietal folds, the upper one like a knob. Long. 21–25, diam. 9–11; apert. long. 13–15 millim.

Hab. Salvador: Sonsonate, a specimen eroded by a Pagurid (*Œrsted* [9]).

S.W. Costa Rica: Punta Arenas (*coll. Strebel*).

S. Panama: Chiriqui (*coll. Dunker, in Mus. Berol.; coll. Strebel, in Mus. Hamburg.*); Panama, under a heap of stones, just above high-water mark (*C. B. Adams* [5]).

Colombia: Tumaco I. (*Cuming* [3 6 7]).

Ecuador: Guayaquil, "sur les bords des eaux stagnantes et dans les eaux stagnantes mêmes, soit sur les branches des arbres inondés, dans un marais aux environs de Guayaquil" (*Fontaine* [1 2]).

MELAMPUS.

Melampus, Montfort, Conch. Syst. ii. p. 319 (1810); Pfeiffer, Monogr. Auric. p. 1856; Fischer & Crosse, Miss. Scient. Mex., Moll. ii. p. 11.

Conovalus, Lamarck (1812); *Auricula*, subg. *Conovalus*, Férussac (1821).

Melampus and *Tralia*, H. & A. Adams, Gen. Recent Moll. ii. p. 244.

Shell coniform or oval, with short spire and long narrow aperture; outer margin of the aperture straight, with one or several elevated spiral ridges (liræ) inside in the

Comparative Table of the Species of *Melampus*.

Nomen.	Figura.	Sculptura et coloratio.	Plicæ parietales.	Margo externus.	Long.	Diam.	Apert.	Patria.
A. Melampus, s. str.					mm.	mm.	mm.	
coffea, *L.*	coniformis, spira convexa, mucronata.	lævis, virescenti-grisea, unicolor vel subfasciata.	plicæ 2 infra medium, superior transversa, inferior debilis.	liris 14–22, albis.	15–19 (24½)	9–12 (13)	12–16 (19)	E. Mexico, Yucatan, British Honduras, Guatemala.
trilineatus, *C. B. Ad.*	ovato-conoidea, spira minima.	lævis, fusco-cinerea, fasciis 2–3 albidis.	plicæ 5–6, superiores 4–5 approximatæ, infima transversa, magna.	callosus, liris numerosis.	14–18	9–11	13–15	W. Costa Rica, S. Panama.
olivaceus, *Carp.*	conoideo-ovata, spira depressa.	lævis, olivacea, fusco-purpureo-adspersa.	plica 1 transversa inter denticulos 2 sita, in junioribus denticuli plures.	liris numerosis, in adultis obsolescentibus.	9–13	6–8	8–11	N.W. Mexico.
bocoronicus, *Mörch*	ovato-obconica, spira perbrevi.	lævis, castanea, fascia angulari pallida.	4, superiores 3 parvæ, approximatæ, infima magna, transversa.	liris numerosis, inæqualibus.	12–16	7–9	8–13	W. Costa Rica.
tabogensis, *C. B. Ad.*	oblongo-ovata, spira brevi, mucronulata.	irregulariter sulcata, nitida, castanea, marg. colum. albido.	2, approximatæ, inferior tuberculiformis.	fusco-limbatus, callo albido, liris 8–9.	12–13	7–8	8–10	S. Panama.
strigosus, *v. Mart.*	obese ovata, spira convexa.	lævis, pallide olivacea, strigis fuscis irregularibus.	1, infera, parva, remota.	liris 3–4, tenuibus.	7½	5	5½	W. Costa Rica.
B. Tralia, *H. & A. Ad.*								
panamensis, *C. B. Ad.*	ovato-oblonga, spira conica, acutiuscula.	lævis, nitidula, rufo-fusca.	2, superior parvula, inferior valida.	superne sinuatus, intus callosus, lira unica, transversa.	10–11 (8)	5 (4)	7 (5½)	W. Costa Rica, S. Panama.
Species dubiæ.								
concinnus, *C. B. Ad.*	ellipsoidea, spira conoidea, acuta.	lævis, nitida, atro-fusca, pallide fasciata.	2, superior magna, infra concava, inferior obliqua.	callosus, liris nullis.	8	5	2¾	S. Panama.
infrequens, *C. B. Ad.*	ellipsoideo-ovata, spira convexe conica; apertura lata.	striata, fusca, infra suturam subfasciata.	1, tenuis, subtransversa.	superne sinuatus, liris nullis.	6	4	4	S. Panama.
bridgesi, *Carp.*	ovalis, spira spiratim striolata.	lævis, nitida, nigro-fusca.	2, superior parva, inferior transversa.	acutus, liris nullis.	5½		3	S. Panama.

more typical species; the opposite (parietal) wall of the aperture usually with one or more spiral or oblique plaits, in addition to the constantly present columellar plait at the base of this wall. Whorls 6–11, very narrow. Surface usually smooth or with a few longitudinal furrows (lines of growth). Eyes distinct, on the surface of the head, behind the base of the feelers. Hinder end of the foot in some species two-pointed.

Widely spread on the tropical and subtropical shores of both hemispheres, but absent from Europe; either in estuaries, at the mouths of rivers and small streams, or on rocks and small stones at high-water mark.

H. & A. Adams distinguish two genera, *Melampus* and *Tralia* (Gray, 1840), on account of the hinder end of the foot being forked in the former and simple in the latter. But as this character has been hitherto observed only in very few species, and has not certainly been made out in the typical *M. coffea*, it is inadvisable to use it. Nevertheless, future travellers and collectors would do well to observe and note the form of the foot whenever they have an opportunity of seeing the living animal.

N.B.—As the columellar plait is common to all the species, it is not particularly mentioned in the comparative Table on p. 557; the number of the parietal plaits indicated in the third column is that of the plaits (or denticles) above the columellar plaits and on the same side of the aperture.

A. Melampus, s. str.

Several parallel ridges inside the outer margin of the aperture. General shape more or less coniform or oval, with very short spire.

1. **Melampus coffea** *.

Buccinum parvum &c., Lister, Hist. Conch. t. 834. fig. 60 (1688) [1].

Bulla coffea, Linn. Syst. Nat. ed. 10, p. 729 (1758) [2].

Voluta coffea, Linn. Syst. Nat. ed. 12, p. 1187 [3].

Melampus coffea, Binney, Land and Freshwater Shells of N. Am. ii. p. 13, fig. 15 [4]; H. & A. Adams, Gen. Recent Moll. ii. p. 243, t. 82. figg. 7 (living animal), 7 *a* (shell) [5]; Pfeiffer, Monogr. Auric. p. 28 [6]; Catal. Auric. Brit. Mus. p. 19 (1857) [7]; v. Mart. in Malak. Blätt. xii. p. 61 (1865) [8]; Tryon, Am. Journ. Conch. iv. p. 8, t. 18. figg. 7, 8 (the latter copied from Adams) [9]; Fisch. & Crosse, Miss. Scient. Mex., Moll. ii. p. 23, t. 34. figg. 10, 10 *a* [10]; Dall, Proc. U.S. Nat. Mus. 1885, p. 280 [11]; Pilsbry, Proc. Acad. Phil. 1891, p. 320 [12].

Auricula midæ &c., Martini, Syst. Conch.-Cab. ii. p. 126, t. 43. fig. 445 [13]; Favanne, Conch. t. 65. fig. H 8 [14].

Bulimus coniformis, Bruguière, in Encycl. Méth., Vers, i. p. 339 (1791) [15].

Melampus coniformis, Montfort, Conch. Syst. ii. p. 318 (1810) [16].

Auricula coniformis, Férussac, Prodr. Hist. Nat. Moll. Terr. p. 105. no. 23 [17]; Lamarck, Hist. Nat.

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* The word *coffea* is a substantive, signifying "coffee" in modern Latin, the shell resembling a coffee-bean in size and colour; it is therefore correct to write *M. coffea*, not *M. coffeus*.

Anim. sans Vert. ed. 1, vi. p. 141 [16]; ed. 2, par Deshayes, viii. p. 332 [19]; Reeve, Conch. Syst. ii. t. 187. fig. 7 [20]; Küster, in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, Auriculaceen, p. 31, t. 4. figg. 14–17 [21]; d'Orbigny, in Sagra's Hist. fis. polit. y nat. de Cuba, p. 100, t. 13. figg. 4, 7 [22].

Conovulus coniformis, Lamarck, in Encycl. Méth., Vers, iii. t. 459. fig. 3 [23]; Woodw. Manual of Mollusca, p. 173, t. 12. fig. 37 [24].

Melampus fasciatus (Chemnitz), Tristram, P. Z. S. 1861, p. 232 [25].

Hab. E. Mexico: without nearer indication of locality [6 7].

Yucatan: Island of Carmen, in the Laguna de Terminos (*Uhde* [8]); Progreso and Silam (*Heilprin* [12]).

British Honduras: Belize, in salt-marshes (*Bocourt* [10]).

N. Guatemala: salt-marshes on the coast (*Salvin* [25]).

Generally spread in the West-Indian Islands—Cuba [6 22], Jamaica (*C. B. Adams*), Haiti (*Hjalmarson*), Puerto Rico (*Blauner*), Guadaloupe (*Beau*), Martinique (*C. de Candé* [22]); also occurring in Texas (*Pope*) and the Florida Keys (*Wurdemann*), and on the continent of South America—Venezuela (*Ernst*), Cayenne [6], Bahia (*Luschnath, in Mus. Berol.*), Lagoa de Tejuca near Rio Janeiro (*v. Martens,* 1860), and Santa Catarina in Southern Brazil (*Fritz Müller*).

Pfeiffer [6] also gives Labrador as a locality, but this is probably a mistake for Barbados. Pilsbry [12] distinguishes a variety, *microspira*, found with typical specimens at Progreso, Yucatan.

2. **Melampus trilineatus.** (Tab. XLIII. fig. 7.)

Auricula trilineata, C. B. Adams, Ann. Lyc. Nat. Hist. N. York, v. p. 434 (1852) [1]; Carpenter, Report Moll. West Coast of N. Am. p. 275 (1857) [2].

Melampus trilineatus, Pfeiffer, Monogr. Auric. p. 44 [3]; Catal. Auric. Brit. Mus. p. 32 [4].

Hab. W. Costa Rica: Punta Arenas (*coll. Strebel*).

S. Panama: Panama (*C. B. Adams* [1–4]).

Five specimens in Strebel's collection show that this species agrees well in general form and colour with *M. coffea* from the Atlantic coast, but differs from it in having 4–5 small horizontal parietal folds above the large parietal one, and in the absence of a smaller one below this. C. B. Adams [1] states that there are four folds: I can see five in the full-grown and somewhat younger specimens from Punta Arenas, but the uppermost are very small; in the still younger ones there are two only. The general colour is brownish-grey, with irregular darker vertical streaks and two or three spiral bands, the uppermost in the largest diameter of the shell, the lowest at about half the height of the last whorl; the third band is only visible in two out of five specimens, and in one of these it disappears in the lower half of the last whorl; the bands also tend to disappear near the aperture, even when two only are present. The reddish colour of the columella is very faintly indicated.

3. **Melampus olivaceus.**

Melampus olivaceus, Carpenter, Catal. Mazatlan Shells, p. 178 (1857)[1]; Report Moll. W. Coast of N. Am. pp. 223, 284[2]; Moll. of W. N. America, pp. 107, 151, 159[3]; Binney, Terr. Moll. U. S. iv. p. 26, t. 79. fig. 8[4]; Land and Freshwater Shells of N. Am. ii. p. 9, fig. 10[5]; Tryon, Am. Journ. Conch. iv. p. 7, t. 18. fig. 4[6]; Pfeiffer, Monogr. Pneumonopom. Suppl. iii. p. 310[7]; Fisch. & Crosse, Miss. Scient. Mex., Moll. ii. p. 24, t. 34. figg. 9, 9*a*[8].

Hab. N.W. Mexico: Mazatlan (*Reigen*[1 2 3]).

Occurs also in California: San Francisco (*Binney*[8]), San Diego (*Hemphill*[7 8], *Green*[6], *Blake*[6]), Cape San Lucas (*Xantus*), Cerres I. (*Ayres & Veitch*).

Binney's[4 5] and Tryon's[6] figures show three dark spiral bands, whereas Carpenter, who had before him many hundreds of specimens, speaks only of irregular purplish-brown tessellated patches.

4. **Melampus bocoronicus.** (Tab. XLIII. fig. 11.)

Melampus bocoronicus, Mörch, in Malak. Blätt. vi. p. 118 (1859)[1]; Pfeiffer, Monogr. Pneumonopom., Suppl. iii. p. 513[2].

Hab. W. Costa Rica: Los Bocorones, near Punta Arenas, beneath stones, near the beach (*Œrsted*[1 2]); Punta Arenas (*Biolley*).

Two specimens collected by P. Biolley, one here figured, both somewhat larger than Dr. Mörch's type, show that there are really four parietal folds besides the columellar one, the three upper ones small and approximate, the lowest of larger size, distant from the others, and also elongated horizontally, not tuberculiform. *M. bocoronicus*, therefore, differs in this respect from *M. tabogensis*, C. B. Ad., which it resembles in general form and colour. Biolley's specimens are rather rough, perhaps by erosion of the dead shells.

5. **Melampus tabogensis.** (Tab. XLIII. fig. 8.)

Auricula tabogensis, C. B. Adams, Ann. Lyc. Nat. Hist. N. York, v. p. 435 (1852)[1]; Reeve, Conch. Icon. xx., *Auricula*, t. 6. fig. 47[2].

Melampus tabogensis, H. & A. Adams, Gen. Recent Moll. ii. p. 244[3]; Pfeiffer, Monogr. Auric. p. 32[4].

Hab. S. Panama: Taboga I. and Panama, on and under stones and rocks, at high-water mark (*C. B. Adams*[1–4]).

6. **Melampus strigosus,** sp. n. (Tab. XLIII. fig. 9.)

Testa obese ovata, imperforata, lævis, pallide olivacea, strigis fuscis irregularibus picta; spira convexe conica, sat brevis, apice suberosa, nigricans; anfr. 7, ultimus sat convexus, basi paullatim attenuatus; apertura verticalis, angusta, $\frac{11}{14}$ longitudinis æquans; plica parietalis unica, sat infera, parva, horizontalis, remota; plica columellaris horizontalis, compressa, valida; margo externus rectus, simplex, non sinuatus, intus liris intrantibus albis tenuibus 3–4 munitus.

Long. $7\frac{1}{2}$, diam. 5; apert. long. $5\frac{1}{2}$, diam. $1\frac{1}{2}$ millim.

Hab. W. Costa Rica: in a small tributary of the Rio Boto, Golfo Dulce, on dead leaves (*Pittier*, March 1896).

The single parietal fold is somewhat within the aperture and does not reach the level of the latter, and therefore may be easily overlooked; it is wanting in young specimens. The ridges (liræ) inside the outer margin are clearly visible in nearly full-grown examples, but almost disappear in the largest full-grown one; in some young specimens these are not to be seen, in others they are also visible outside in the form of narrow white bandlets. The columellar fold is well developed in all stages of growth.

B. Tralia, Gray.

7. **Melampus panamensis.** (Tab. XLIII. figg. 10, 10*a*.)

Auricula panamensis, C. B. Adams, Ann. Lyc. Nat. Hist. N. York, v. p. 433 (1852) [1].

Tralia panamensis, H. & A. Adams, Gen. Recent Moll. p. 244 [2].

Melampus panamensis, Pfeiffer, Monogr. Auric. p. 48 [3]; Catal. Auric. Brit. Mus. p. 35 [4]; Dall, Proc. Acad. Phil. 1900, p. 97 [5].

Hab. W. Costa Rica: Punta Arenas (*Biolley*).

S. Panama: Panama and Taboga I., under stones at high-water mark, or crawling over wet stones (*C. B. Adams* [1]).

Cocos I. (*Snodgrass & Heller* [5]).

This is the Pacific representative of the West-Indian *M. pusillus*, Gmel. (*Auricula nitens*, Lam., Martini, Syst. Conch.-Cab. ii. t. 43. fig. 446; ibid. new edition by Küster, Auriculaceen, t. 2. figg. 11–13; Pfeiffer, Monogr. Auric. p. 47; Catal. Auric. Brit. Mus. p. 34; Tryon, Am. Journ. Conch. iv. t. 18. fig. 9), which may yet be found on the Caribbean coast of Central America. It differs from *M. pusillus* in its smaller size and more slender shape, and in the more oblique position of the lower parietal fold. We give figures of *M. panamensis* from specimens in Pætel's collection, now in the Berlin Museum, these varying in the comparative breadth. Amongst more than twelve examples obtained at Punta Arenas by Mr. Biolley, none measure more than 8 millim. in length, 4 in breadth, and $5\frac{1}{2}$ in the aperture.

Doubtful species, without ridges inside the outer margin, none of them figured.

8. **Melampus (?) concinnus.**

Auricula concinna, C. B. Adams, Ann. Lyc. Nat. Hist. N. York, v. p. 432 (1852) [1].

Ophicardelus concinnus, H. & A. Adams, P. Z. S. 1854, p. 34 [2].

Melampus concinnus, Pfeiffer, Monogr. Auric. p. 57 [3]; Catal. Auric. Brit. Mus. p. 43 [4].

Hab. S. Panama: Panama, on the short suckers which were growing up thickly beneath the mangroves near high-water mark [1].

9. **Melampus (?) infrequens.**

Auricula infrequens, C. B. Adams, Ann. Lyc. Nat. Hist. N. York, v. p. 433 (1852) [1].

Tralia infrequens, H. & A. Adams, Gen. Recent Moll. ii. p. 244 [2].
Melampus (?) *infrequens*, Pfeiffer, Monogr. Auric. p. 55 [3]; Catal. Auric. Brit. Mus. p. 40 [4].

Hab. S. Panama: under stones near high-water mark, at the base of the sea-wall at Panama (*C. B. Adams* [1]).

10. **Melampus (?) bridgesi.**

Melampus bridgesi, Carpenter, P. Z. S. 1856, p. 161 [1]; Report Moll. W. Coast of N. Am. pp. 284, 315 [2].
?*Auriculus avena*, Pfeiffer, Monogr. Pneumonopom. iii. p. 361 [3].

Hab. S. Panama: "Ad oras sinus Panamensis" (*Bridges* [1–3]).

PEDIPES.

Pedipes, Adanson, Voy. au Sénégal, p. 11 (1757); Férussac, Prodr. Hist. Nat. Moll. Terr. pp. 99, 109 (1821); H. & A. Adams, Gen. Recent Moll. ii. p. 248; Pfeiffer, Monogr. Auric. p. 65; Fischer & Crosse, Miss. Scient. Mex., Moll. ii. p. 25.

Shell subglobular, imperforate, thick, with spiral furrows, unicolorous, of rather small size; aperture somewhat large, with a strong parietal fold and two columellar teeth; outer margin of the aperture straight, inside callous or toothed. Foot of the animal divided by a transverse furrow, by which it is enabled to loop in crawling, like the larva of a Geometrid moth (Adanson, "pedi pes subsequens").

Scattered throughout the tropical and subtropical shores, chiefly of the Atlantic basin, on stones and rocks at high-water mark.

1. **Pedipes angulatus.**

Pedipes angulata, C. B. Adams, Ann. Lyc. Nat. Hist. N. York, v. p. 431 (1852) [1]; Carpenter, Report Moll. West Coast of N. Am. p. 316 (1857) [2].
Pedipes angulatus, Pfeiffer, Novitates Conch. i. p. 24, t. 6. figg. 26–28 [3]; Monogr. Auric. p. 71 [4]; Catal. Auric. Brit. Mus. p. 53 [5].

Globose, angulated in the upper part of the last whorl, olivaceous-brown, with two strong parietal folds, the upper one more sharp and prominent, and with a smaller columellar fold; outer margin of the aperture thickened, with a blunt tooth.
Long. $7\frac{1}{2}$, diam. 5; apert. 4 millim.

Hab. S. Panama: Panama, under stones at high-water mark (*C. B. Adams* [1–5]).

Two other species, *P. liratus*, Binn., and *P. unisulcatus*, Carp., are found in the peninsula of California (see Carpenter, Report Moll. W. Coast of N. Am. pp. 275, 316; Binney, Land and Freshwater Shells of N. Am. ii. p. 69; and Fischer & Crosse, Miss. Scient. Mex., Moll. ii. pp. 28, 29); another, *P. mirabilis*, Meg. (Pfeiffer, Monogr. Auric. p. 70), in Cuba, Jamaica, Puerto Rico, and Guadaloupe. It is probable, therefore, that the genus is represented all along both shores of Mexico and Central America.

MARINULA.

Marinula, King, Zool. Journ. v. p. 343 (1832); H. & A. Adams, Gen. Recent Moll. ii. p. 246; Pfeiffer, Monogr. Auric. p. 59.

Shell oval, imperforate, thick, without spiral sculpture; aperture rather large, broad, with two parietal folds and a smaller columellar one beneath them; outer margin of the aperture straight, simple. Foot of the animal not divided by a transverse furrow.

Spread throughout the tropical and subtropical shores of both hemispheres—the typical species on the western coast of South America, on stones and rocks at high-water mark.

1. Marinula acuta.

Auricula acuta, d'Orbigny, in Guérin's Mag. Zool. 1835, p. 23 [1]; Voy. Amér. mérid., Moll. p. 326, t. 42. figg. 4–6 [2]; C. B. Adams, Ann. Lyc. Nat. Hist. N. York, v. p. 432 (1852) [3]; Carpenter, Report Moll. West Coast of N. Am. p. 275 (1857) [4].

Marinula acuta, Pfeiffer, Monogr. Auric. p. 62 [5]; Catal. Auric. Brit. Mus. p. 45 [6].

Fusiform-oblong, faintly striate, brown, with some darker streaks; two strong parietal folds, the columellar fold tooth-like; outer margin of the aperture straight.

Long. 12½, diam. 5½; apert. long. 7½ millim.

Hab. S. Panama: Panama, under stones near high-water mark (*C. B. Adams* [3 4]).

Ecuador: Guayaquil, near brackish water (*Fontaine* [1 2 5 6]).

In its general aspect this species resembles the European members of the genus *Alexia*, but differs from them in the straight outer margin. *M.* (*Auricula*) *recluziana*, Petit (P. Z. S. 1842, p. 201), from Tumaco, on the coast of Colombia, possibly belongs to this species rather than to *M. pepita*, King, from Chile and Chiloe, with which it was united by Pfeiffer (*loc. cit.*).

BLAUNERIA.

Blauneria, Shuttleworth, Diagn. neuer Moll. pt. vi. p. 148 (Mittheil. d. naturf. Ges. Bern, 1854); Pfeiffer, Malak. Blätt. vii. p. 152 (1854); Monogr. Auric. p. 153.

Shell sinistral, oblong, imperforate, thin, white; aperture oblong, rather narrow, with a columellar fold; outer margin simple. Eyes at the upperside of the head, directly behind the feelers, which are short and cylindrical.

Inhabits the West Indies, Yucatan, the Hawaiian Islands, and New Caledonia.

Named in honour of Bernh. Friedr. Blauner, who collected and died in Puerto Rico in 1853.

1. Blauneria heteroclita.

Voluta heteroclita, Montagu, Test. Brit., Suppl. p. 169 (1808) [1]; Laskey, in Memoirs of the Wernerian Society, i. p. 398, t. 8. figg. 1. 2 [2]; Forbes & Hanley, Brit. Moll. iii. p. 526 [3].

Blauneria heteroclita, Fisch. & Crosse, Miss. Scient. Mex., Moll. ii. p. 9, t. 34. figg. 14, 14*a*, *b* [4]; Dall, Proc. U.S. Nat. Mus. 1885, p. 287, t. 12. fig. 6 [5].

Tornatellina cubensis, Pfeiffer, Monogr. Helic. ii. p. 391 (1848) [6].
Blauneria pellucida, Pfeiffer, Monogr. Auric. p. 153 (1856) [7]; Catal. Auric. Brit. Mus. p. 110 [8]; H. & A. Adams, Gen. Recent Moll. ii. p. 643, t. 138. fig. 8 [9]; Binney, Land and Freshw. Shells of N. Am. ii. p. 21, fig. 22 [10]; Tryon, Am. Journ. Conch. iv. p. 10, t. 1. fig. 13 [11].

Conoidal-elongate, polished, white.
Long. 5, diam. $1\frac{2}{3}$; apert. long. 2 millim.

Hab. YUCATAN: Sisal (*Morelet* [4]).

Also inhabits Florida [7 8 10 11] (*Hemphill* [5]) and the West Indies—Cuba (*Pfeiffer* [6 7 8]), Jamaica (*C. B. Adams* [7 8]), Haiti (*Sallé* [4]), Puerto Rico (*Blauner* [7]), Guadaloupe (*Schramm* [4]).

Very little is known of the habits of this species, the dead shell being usually found among other small mollusks drifted on sandy beaches. It has been recorded from Dunbar [1 2], on the British coast, where it was probably introduced with ballast [3]. Dall [5] notes that Mr. Hemphill met with it at Marca, Florida, in damp moss, in a dried-up brackish swamp.

Fam. TRUNCATELLIDÆ.

TRUNCATELLA.

Truncatella, Risso, Hist. Nat. de l'Europe mérid. iv. p. 124 (1826); H. & A. Adams, Gen. Recent Moll. ii. p. 310; Pfeiffer, Monogr. Auric., App. ii. p. 181, &c.

Shell of small size, when full-grown cylindrical, consisting of 3–5 whorls only; upper end blunt, truncated, and cicatrized; aperture perpendicular, suboval or elliptical, with continuous thickened and somewhat expanded peristome. Sculpture consisting of small longitudinal ribs, which are often more distinct in the upper whorls and more or less feeble and disappearing in the last. Young shells turrited, with more whorls, pointed at the upper end, with thin sharp peristome. Operculum thin, with basal spiral nucleus. Feelers short, blunt; eyes behind them on the surface of the head, as in the Auriculidæ; snout bilobate. Foot rounded at both ends. The animal crawls by fixing alternately the further or the hinder part of the foot, in the same manner as the larva of a Geometrid moth.

Generally distributed in temperate and tropical regions. The various species live in places reached by the tide, on stones and seaweed, and are able to live many weeks out of the water.

The throwing-off of the upper whorls is as regular in this genus as it is in *Rumina decollata*, L., in Southern Europe, or in some species of *Potamides*; among 400 specimens of *T. bairdiana* collected by C. B. Adams at Panama, there was only a single full-grown one which had preserved its upper whorls, and these were bleached and cretaceous, as if decayed.

Comparative Table of the Species of *Truncatella*.

Nomen.	Forma.	Sculptura.	Basis.	Peristoma aperturæ.	Anfr. superstites.	Long.	Diam.	Apertura.	Patria.
caribæensis, *Sow.* ...	subcylindrica, parum attenuata, rubella, succinea vel flavida.	costulis confertis subrectis, sæpe in medio anfractuum evanescentibus.	breviter carinato-cristata.	simplex, rectum.	3–4	mm. 7–8	mm. 3	mm. 2½	E. Mexico.
bairdiana, *C. B. Ad.*	cylindracea, pellucida, succineo-cornea.	plicis longitudinalibus, subconfertis, obtusis.	crenata, vix compressa.	duplex, externum cristæforme.	4	5	1½	1½	W. Mexico, S. Panama.
bilabiata, *Pfr.*	cylindracea, gracilis, fusca.	costis subarcuatis, elevatis, obtusis, interstitia æquantibus.	subcompressa, callosa.	duplex, ext. album patens, int. porrectum.	4½–5	5½	1¾	1½	Yucatan.

N.B.—*Truncatella* (?) *dubiosa*, C. B. Adams [Ann. Lyc. Nat. Hist. N. York, v. p. 435 (not figured), *cf.* Pfeiffer, Monogr. Auric. p. 178], found with *T. bairdiana*, is either a young specimen of this or of some other *Truncatella*. The *Truncatella* (?) sp., quoted by P. Carpenter, Catal. Mazatlan Shells, p. 364, as found "off Spondylus," probably does not belong to this genus, on account of its habitat, which indicates a true marine shell.

1. **Truncatella caribæensis.**

Truncatella caribæensis, Sowerby, in Reeve's Conch. Syst. ii. p. 182, fig. 7 (1842) [1]; Küster, in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, *Truncatella*, p. 9, t. 1. figg. 35–37, and t. 2. figg. 1–4, 22 (full-grown), 5, 6 (young) [2]; Pfeiffer, Zeitschr. f. Malac. 1846, p. 182 [3]; Monogr. Auric. p. 185 [4]; Catal. Auric. Brit. Mus. p. 134 [5]; Binney, Land and Freshw. Shells of N. Am. iii. p. 98, fig. 198 [6]; Tryon, Am. Journ. Conch. iv. p. 14, t. 18. figg. 27, 28 [7].

Truncatella succinea, C. B. Adams, Proc. Bost. Soc. Nat. Hist. 1845, p. 12 [8].

Hab. E. Mexico: Mexico, without nearer indication of locality (*Hegewisch* [3–6]).

Also occurs in Cuba (*Pfeiffer* [3–5]) and Jamaica (*C. B. Adams*), and on the Florida Keys [6 7].

The Mexican specimens are stated by Pfeiffer [3] to be somewhat smaller than the Cuban ones.

2. **Truncatella bairdiana.**

Truncatella bairdiana, C. B. Adams, Ann. Lyc. Nat. Hist. N. York, v. p. 437 (1852) [1]; Carpenter, Report Moll. W. Coast of N. Am. p. 275 (1857) [2]; Moll. of W. N. America, pp. 154, 194 (1872) [3]; Pfeiffer, Monogr. Auric. p. 187 [4].

Hab. W. Mexico: Acapulco (*Belcher* [3]).

S. Panama: Panama, under a heap of stones at the bottom of the sea-wall, at high-water mark of spring-tides, copiously (*C. B. Adams* [1–4]).

Named in honour of the herpetologist, F. S. Baird.

3. **Truncatella bilabiata.**

Truncatella bilabiata, Pfeiffer, Archiv für Naturg. 1840, p. 253 [1]; Monogr. Auric. p. 192 [2]; Küster, in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, *Truncatella,* p. 7, t. 1. figg. 27–29 (full-grown), 30, 31 (young) [3]; Binney, Land and Freshw. Shells of N. Am. iii. p. 99, fig. 199 [4]; Tryon, Am. Journ. Conch. iv. p. 14, t. 18. figg. 32, 33 [5].

Hab. Yucatan: Carmen Island (*Morelet* [2–5]).

Also in Cuba (*Pfeiffer* [1 2 3]) and Florida (*Binney* [4 5]).

According to Pfeiffer [2], Prof. Bronn, of Heidelberg, possesses examples of this species from Carmen Island, probably sent to him, with many others, by Morelet.

Fam. CERITHIIDÆ.

One genus of this family is essentially submarine, living mostly in mangrove-swamps.

POTAMIDES.

Potamides, Brongniart, Ann. du Mus. d'Hist. Nat. Paris, xv. p. 367 (1810); P. Fischer, Manuel de Conch. p. 680.

Shell turrited, many-whorled, with knobbed or ribbed sculpture, and a dark brown or grey periostracum, in many species provided on some whorls with thickenings, which are the remains of a former aperture (varices); aperture comparatively small, vertically placed, rounded, with a notch or short channel below. Operculum horny, orbicular, many-whorled.

Living animal with a produced snout and two slender, pointed feelers, the eyes on protuberances at the outer side of the feelers near the base; foot short, somewhat square, the anterior angles produced. Lives chiefly in brackish water, at the roots and on the stems of mangrove shrubs, to which it can affix itself by slimy threads.

Differs from the well-known genus *Cerithium,* Brug., by the many-whorled operculum, and by its habit of dwelling in brackish water, to which the mud-coloured, rather thick periostracum is adapted. If the shell is somewhat worn or bleached, its colour becomes brighter, either violet or chestnut-brown.

A. Adams (Zool. Voy. 'Samarang,' Moll. p. 44) says that in some species of the subgenus *Cerithidea,* from the Indian seas, the feelers are very short, and bear the eyes at their distal end, *i. e.* the slender portion of the feeler beyond the eyes is wanting; and on this character a separate genus has been proposed, named *Phœnommia*

by Mörch [Malak. Blätt. vii. p. 80 (1860)], and *Aphanistylas* by P. Fischer [Manuel de Conchyliologie, p. 682]. In the species which I have observed alive at Singapore the feelers had this appearance when the animal was crawling above the surface of the water, but when below it the upper part of the feeler was distinctly present; on closer examination, however, it was seen that, out of the water, the upper portion of the feeler was bent back and closely applied to the head, so as to be scarcely visible. I suppose that this was also the case in the specimens observed by A. Adams.

Two subgenera are represented in Central America, about one of which there is a good deal of confusion.

Subgen. 1. Cerithidea, Swains.

Shell beset with vertical, closely-placed ribs, which are often somewhat arcuated, and in some species latticed (cancellated) by the crossing of spiral ridges. Outer margin of the aperture in most of the species much thickened: if such thickenings are already formed in earlier stages of growth they remain as varices in the full-grown shell, usually one on each of the last three or four whorls, but not at regularly equal distances. Aperture scarcely notched below.

In the species of this subgenus from the tropical regions of the Old World the upper whorls are lost very regularly in the full-grown specimens, so that the shell is broadly truncated above and consists of 4–6 whorls only; in the examples from the Atlantic and Pacific shores of America this is not the case, the upper end of the shell being usually pointed, or only a little worn, not more than one or two whorls being lost. In several of the American and other forms the ribs become comparatively more numerous on the last whorl, but also more feeble and unequal, than on the preceding whorls; it is safer, therefore, to count the ribs of the penultimate whorl when giving the differential characters of the species. Most of them have a pale spiral band on the middle of each whorl: this is in some specimens more distinct and apparent, in others not so well defined or even absent; it is usually more conspicuous in shells which are somewhat worn, and of a chestnut-brown or violet colour, than in the fresh, mud-coloured state. I have therefore not made use of this character in the Table of the species.

Subgen. 2. Rhinocoryne, n.

Potamides pacificus (Sow.) differs from all the other submarine species of Cerithiidæ in having a projecting channel at the base of the aperture, well separated by a distinct constriction from the hole of the aperture, and running obliquely downward and backward.

It has been placed by H. & A. Adams in the genus *Potamides*, Brongn., together with the Australian *P. ebeninus* (Gen. Recent Moll. i. p. 290), and they were followed in this respect by Reeve and others. Brongniart, however, mentions neither of these forms, but describes and figures only a new fossil one, *P. lamarcki* (nec *Cerithium lamarcki*, Val.,

Comparative Table of the Species of *Potamides*.

Nomen.	Forma.	Sculptura.	Apert. margine externo.	Long.	Diam.	Apert.	Patria.
I. Cerithidea, *Swains.* varicosus (*Sow.*)	conoidea, superne gracilis, inferne dilatata.	noduloso-cancellata, costis anfr. ult. c. 12–15, varicosa, basi concentrice lirata.	incrassato et modice expanso.	mm.	mm.	mm.	
——, *a.* validus, *C. B. Ad.* ...	,,	,,	,,	35–41	16–21	11½-13½	W. Nicaragua, W. Costa Rica, S. Panama.
——, *b.* hegewischi, *Phil.*.....	,,	noduloso-cancellata, costis anf. ult. confertis, ultra 20.	,,	23–34	10–15	6–8	N.W. Mexico, W. Guatemala.
montagnei, *d'Orb.*	late conoidea.	costis in anfr. penultimo crebris, c. 24, interstitiis lævibus, basi spirat. lirata, varicibus nullis.	valde expanso et dilatato, fuscescente.	32–44	14–25	12–18	N.W. Mexico, W. Guatemala, W. Costa Rica, S. Panama.
——, var. pulcher, *C. B. Ad.*	latiuscule conoidea.	costis anfr. ult. nodulosis, interstitiis striatis.	,,	35	18	12	S. Panama.
costatus, *Dacosta*	turrita, anfr. convexis, sutura profunda.	costis convexis, subnodulosis, in anfr. ult. irregularibus, in penult. c. 33; sub peripheria bicarinata, basi non conspicue lirata.	subexpanso, non incrassato.	11–13 (-17 ?)	3½–5	3½	Yucatan.
tenuis, *Pfr.*	conoideo-turrita.	costis subobliquis, in anfr. ult. frequentioribus, c. 30, trinodulosis, interstitiis lævibus; basis levius concentr. lirata.	modice expanso, non incrassato.	23	8	6	S.E. Mexico.
II. Rhinocoryne, *v. Mart.* pacificus, *Sow.*	conico-turrita, canali distincto, oblique porrecto.	tuberculis acutis in serie spirali unica dispositis.	recto, obtuso, albo, non expanso.	32–36	15-21½	13–16	S.W. Costa Rica, S. Panama.

1833), and mentions in a footnote some recent species which would come into the same genus, as *P. palustris*, L., and *P. muricatus*, Brongn. (=*fuscatus*, Linn.). His fossil *P. lamarcki* is very near *P. fuscatus*, and so I think the name *Potamides*, in its restricted sense, must be applied to the subdivision which contains the West-African forms *P. fuscatus* and *P. radula*, *e. g.* the division called *Tympanotonos* (Klein) by Mörch, H. & A. Adams, Reeve, P. Fischer, &c. *Tympanotonos* of Klein (1753) includes various Cerithiidæ, but the shell figured by Klein himself to illustrate it is *Vibex fuscus*, Müll. (=*Claviger matoni*, Brot.), placed by most recent authors among the Melaniidæ. *P. ebeninus* is the type of *Pyrazus*, Montfort, and it may be placed near *P. palustris*; but for *P. pacificus* a new subgeneric name is wanted. The form of its operculum, however, is not known (at least it is not known to me), and therefore I am not quite satisfied whether *P. pacificus* really belongs to *Potamides* or to *Cerithium*, near *C. uncinatum* (Gmel.), as Kobelt suggests. Its habit of living in mangrove-thickets, however, suggests that it is nearest allied to *Potamides*.

I. Cerithidea, Swains.

1. Potamides varicosus.

a. *validus*.

Cerithium varicosum (Val.), Kiener, Iconogr. p. 94, t. 30. fig. 2 (1842) [1]; Deshayes, in Lamarck's Hist. Nat. d'Anim. sans Vert. éd. 2, ix. p. 321 [2]; d'Orbigny, Voy. Am. mér., Moll. p. 443 [3]; Sowerby, Thes. Conch. ii. p. 887 (part.), t. 185. fig. 280 [4]; Kobelt, in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, *Cerithium*, p. 58, t. 12. figg. 2, 3 [5].

Cerithidea varicosa, Reeve, Conch. Icon. xv., *Cerithidea*, t. 3. fig. 19 *a* [6]; Carpenter, Report Moll. W. Coast of N. Am. pp. 230, 272, 325 [7]; Moll. of W. N. Am. pp. 24, 186 (1872) [8]; Troschel, Gebiss d. Schnecken, i. p. 147, t. 12. fig. 3 (radula) [9].

Cerithium validum, C. B. Adams, Ann. Lyc. Nat. Hist. N. York, v. p. 381 (1852) [10].

Cerithidea valida, Mörch, Malak. Blätt. vii. p. 80 (1861) [11].

Cerithium fortiusculum, Bayle, Journ. de Conch. xxviii. p. 250 (1880) [12].

Potamides montagnei (part.), Tryon, Man. Conch. ix. p. 161, t. 53. fig. 58 (copied from Reeve) [13].

Vertical ribs rather straight and composed of strong tubercles connected by a feeble ridge; on the last whorl the ribs diminish in number in comparison with those of the preceding whorls, only 12–15, in somewhat smaller specimens (full-grown?) 18. Varices usually yellowish-brown behind, white in front.

Long. 35–41, diam. (incl. peristom.) 16–21 millim.

Hab. W. Nicaragua: Realejos, at roots of mangroves (*Cuming* [4 6]).

W. Costa Rica: Punta Arenas, in the Gulf of Nicoya (*Œrsted* [11] *& C. Hoffmann, in Mus. Berol.*).

S. Panama: Panama (*Jewett* [8]), half buried in muddy sand, under bushes, at high-water mark (*C. B. Adams* [10]).

Colombia: Tumaco (*Hopke, in Mus. Berol.*).

Ecuador: Guayaquil, in brackish water of the river of that name, very common (*d'Orbigny* [3]).

b. *hegewischi.*

Cerithium varicosum, Valenciennes, in Humboldt's Obs. Zool. ii. p. 253 (1833) [14].

Cerithium (*Potamides*) *hegewischi*, Philippi, Zeitschr. f. Malak. 1848, p. 19 [15]; Abbild. neuer Conch. iii. p. 15, t. 1. fig. 6 [16]; Kobelt, in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, *Cerithium*, p. 64, t. 13. fig. 1 [17] (copied from Philippi).

Potamis hegewischi, Carpenter, Report Moll. W. Coast of N. Am. p. 233 (1857) [18].

Cerithidea varicosa, var. *mazatlanica*, Carpenter, List Mazatlan Shells, p. 344 (1857) [19]; Reeve, Conch. Icon. xv., *Cerithidea*, t. 3. fig. 19 *b* [20].

Cerithidea mazatlanica, Reeve, Conch. Icon. xv., *Cerithidea*, t. 1. fig. 8 [21]; Carpenter, Moll. W. N. Am. pp. 108, 186 (1872) [22].

Cerithium mazatlanicum, Kobelt, loc. cit. p. 161, t. 30. figg. 4, 5 [23].

Potamides sacrata (A. Gould) (part.), Tryon, Manual of Conch. ix. p. 162, t. 33. fig. 70 (copied from Reeve) (not figg. 69, 71, 72) [24].

Smaller, only 33–34 millim. in length. Of the six spiral rows of knobs in the last whorl between the suture and the basal angle, the two upper ones are often smaller, disappearing entirely in some specimens, so that only four remain. According to Philippi, the ribs are more arcuated, thirty in number, and the varices of a milk-white colour.

Hab. N.W. Mexico: Mazatlan (*Reigen* [19 23]); Mexico, without nearer indication of locality (*Hegewisch* [15–17]).

W. Guatemala: Champerico (*Champion*, *Stoll*).

The Guatemalan specimens seen by me measure only 27–30 millim. in length and 11–11½ in diameter; aperture 7½–8½ millim.

N.B.—*P. iostomus*, Pfeiffer (Arch. f. Naturg. 1840), from Cuba, much resembles the smaller forms of this species, having also very conspicuous varices; but its sculpture is only ribbed, not latticed, and the shell is not so much attenuated above and dilated below as in *P. varicosus* *.

* There is some difficulty regarding the name of this species: Valenciennes [14] and Sowerby (Genera of Shells, part 42) each used the name *Cerithium varicosum*, apparently in the same year, 1833. Valenciennes gives a description only, without figure, and mentions as locality "Cumana"; he describes the sculpture as "treillisée" (latticed), and therefore I have no doubt that he had before him the species of the western shore, not *P. iostomus*, Pfr., from the Caribbean coast. He gives the same locality, Cumana, for his *Cerithium humboldti*, Val. = *Potamides pacificus* (Sow.), a species inhabiting the Pacific coast. Sowerby, on the contrary (Genera of Shells, part 42, t. 259. fig. 5), gives only a figure, without description, and no indication of locality; this figure is reproduced by Reeve (Conch. Syst. ii. t. 126. fig. 9), and I am inclined to refer it to the West-Indian *P. iostomus*, Pfr., from its size and appearance. In his later work, 'Thesaurus Conchyliorum,' the greater part of the description and the first figure, 284, apply to the larger form of this species, fig. 281 probably to *P. albovaricosus*, and fig. 282, without varices, to yet another species.

Bayle [12] has given a new name (*C. fortiusculum*) to *Cerithium varicosum*, Sow., on account of the latter being preoccupied (*C. varicosum*, Defrance, 1817), a fossil form; but in the genus *Potamides* or *Cerithidea* the name has not been used, so far as I am aware.

2. Potamides montagnei.

Cerithium montagnei, d'Orbigny, Voy. Am. mér., Moll. p. 443, t. 63. figg. 3, 4 (1835–43) [1]; Kiener, Iconogr. p. 99, t. 50. fig. 1 (1842) [2]; Menke, Zeitschr. f. Malak. 1850, p. 178 [3]; Eydoux et Souleyet, Voy. Bonite, Moll. t. 39. figg. 6, 7 [4]; Sowerby, Thes. Conch. ii. p. 888, t. 186. figg. 284, 286 (juv.) [5]; Kobelt, in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, *Cerithium*, p. 54, t. 11. figg. 5, 6 [6].

Cerithidea montagnei, Carpenter, Catal. Mazatlan Shells, p. 342 [7]; Report Moll. W. Coast of N. Am. p. 325 (1857) [8]; Moll. W. N. Am. pp. 24, 27, 151 (1872) [9]; Reeve, Conch. Icon. xv., *Cerithidea*, t. 4. fig. 26 [10].

Potamides montagnei, Tryon, Manual of Conch. ix. p. 161, t. 33. fig. 57 [11] (copied from Reeve) (not fig. 58).

Cerithium reevianum, C. B. Adams, Ann. Lyc. Nat. Hist. N. York, v. p. 380 (1852) [12].

Cerithidea reeveana, Mörch, in Malak. Blätt. vii. p. 19 (1861) [13].

Hab. Lower California: La Paz (*Major Rich* [9]); Cerro Island (*Dr. Ayres & Dr. Veitch* [9]).
N.W. Mexico: Mazatlan, common (*Melchers* [3], *Reigen* [7]).
W. Guatemala: Champerico (*Champion*).
W. Costa Rica: Punta Arenas (*Œrsted* [13]).
S. Panama, not uncommon, half buried in muddy sand, under bushes, at high-water mark, near the mangrove thicket, $2\frac{1}{2}$ miles east of Panama (*C. B. Adams* [12]).
Ecuador: Guayaquil, in brackish water of the river of that name, with *P. varicosus* (*d'Orbigny* [1]).

Full-grown specimens vary considerably in size, from 32–33 ([1 2]) to 44 millim. ([10]) in length, $15\frac{1}{2}$–25 millim. in the diameter of the last whorl, including the peristome, and 12–18 millim. in the length of the aperture.

Var. *pulcher*.

Cerithium montagnei, Sowerby, Thes. Conch. ii. t. 185. fig. 285 [14].

Cerithium pulchrum, C. B. Adams, Ann. Lyc. Nat. Hist. N. York, v. p. 380 [15]; Kobelt, loc. cit. p. 58, t. 11. figg. 7, 8 [16].

Cerithidea pulchra, Carpenter, Report Moll. W. Coast N. Am. p. 272 [17]; Moll. W. N. Am. p. 186 [18]; Mörch, Malak. Blätt. vii. p. 80 [19]; Reeve, Conch. Icon. xv., *Cerithidea*, t. 4. fig. 39 [20].

Patamides montagnei, var. *pulchra*, Tryon, Manual of Conch. ix. p. 161, t. 34. fig. 50 (copied from Reeve) [21].

With one varix and the ribs somewhat nodulous by crossing the spiral striæ. General form comparatively broader, and the peristome more darkly coloured, but these last-mentioned differences do not hold good in all specimens. Size the same as in the smaller full-grown specimens of the typical form.

Hab. S. Panama, with the typical form (*C. B. Adams* [16–20]).

At first sight, the var. *pulcher* seems to be sufficiently distinct from *P. montagnei* by the cancellated appearance of the sculpture and by the presence of a varix in the last five whorls, both characters bringing it near *P. varicosus*; but on a closer examination

of normal specimens of *P. montagnei* some feeble spiral ridges are visible on the last whorl just above the basal keel, causing slight nodules by crossing the ribs. In the var. *pulcher* it is usually the last whorl also which shows the cancellated sculpture more conspicuously, but in its whole extent between the suture and the basal keel, whereas in the penultimate and antepenultimate whorls the spiral ridges are very faint, if they exist at all. Whether the presence of varices is constantly united with a distinct cancellated structure of the last whorl, I cannot decide, having but few specimens before me. The form and colour of the aperture is in the var. *pulcher* quite as in the normal *P. montagnei*.

N.B.—*Cerithium largillierti*, Philippi (Zeitschr. f Malak. 1848, p. 20; Abbild. neuer Conch. iii. p. 15, t. 1. fig. 7)=*Cerithidea fortunei*, Reeve (Conch. Icon. xv. t. 3. fig. 15 *a*), from China, is incorrectly quoted by Reeve as synonymous with *C. montagnei*.

3. **Potamides costatus.** (Tab. XLIV. figg. 11, 11 *a*.)

Strombiformis costatus, Dacosta, Brit. Conch. p. 118, t. 8. fig. 14 (1778) [1].

Strombus costatus, Montagu, Test. Brit. i. p. 255 (1803) [2].

Cerithium costatum, Forbes & Hanley, Hist. Brit. Moll. iii. p. 20 [3]; Kobelt, in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, *Cerithium*, p. 179, t. 33. fig. 10 [4].

Cerithidea costata (Dacosta) (part.), Tryon, Manual of Conch. ix. p. 164, t. 34. fig. 82 (copied from Reeve) [5].

Cerithium salmacidum, Morelet, Test. Noviss. i. p. 27 (1849) [6]; Kobelt, loc. cit. p. 63, t. 12. figg. 8, 9 (not quite full-grown) [7].

Cerithidea salmacidum, Mörch, Malak. Blätt. xxiii. p. 90 (1876) [8]; Reeve, Conch. Icon. xv., *Cerithidea*, t. 4. fig. 23 (*salmacida*) [9].

Turrited, very slender, with deep sutures, dark brown; 12 whorls, very convex, in some specimens nearly biangulated; ribs perpendicular, numerous, about 33 in the penultimate, only 26 in the antepenultimate whorl, swelling into two small knobs in some specimens at the crossing of the subangular spiral elevations; on the last whorl, on the contrary, the ribs are much more feeble and irregular, wanting here and there; the periphery of the last whorl encircled by a feeble spiral keel, which in some specimens is followed by another lower and more feeble one; the rest of the basis without spiral ridges. Usually without varices. Aperture with somewhat vaulted, but scarcely thickened peristome. Operculum circular, a little concave, with many whorls; the nucleus near its middle, the margin very thin, diaphanous.

Long. 13–14, diam. 5–5½, long. apert. 3½ millim.

Hab. YUCATAN: Sisal, in swamps of the sea-shore (*Morelet* [6]); Progreso (*Höge*); Yucatan, without nearer indication of locality (*Poulsen* [8], *H. Dohrn* [7]).

Also on the shores of the West-Indian Islands [3 4], but not British as had been formerly supposed [1 2].

The above description is taken from a choice of the most perfect and best-preserved specimens out of a great number collected by Herr Höge at Progreso, none of which measure 17 millim., the length assigned to the species by Morelet [6]. In most of them there are no varices at all, but in some there is a single varix on the last whorl, quite near the aperture, perhaps a duplication of the peristome; it is, however, of the same

colour as the rest of the surface, not whitish or white, as in *P. iostomus*, Pfr., and *P. varicosus*, Sow. Many of the Progreso shells are not full-grown, with a very thin simple peristome, like the specimen figured by Kobelt [7]. Others are more or less worn, with the ribs scarcely visible or absent.

The description given by Forbes and Hanley [3] applies so well to the specimens before me that I have no hesitation in referring them to *P. costatus*. As regards *P. lafondi*, Michaud, and *P. ambiguus*, C. B. Adams, I am not satisfied concerning their identity, or as to how they differ from *P. costatus*, various forms being labelled with these names in collections; Kiener's figure of *P. lafondi* (Iconographie, *Cerithium*, t. 24. fig. 3) and Reeve's figure of *P. ambiguus* (Conch. Icon. xv., *Cerithidea*, t. 2. figg. 9 *a*, *b*) appear to me to differ from *P. costatus*, as well as from one another.

Dr. Mörch [8] and Kobelt [4 7] treat *P. salmacidus* * and *P. costatus* as distinct species.

4. Potamides tenuis.

Potamides tenuis, Pfeiffer, in Archiv f. Naturg. 1839, p. 537 [1].

Cerithidea tenuis, Reeve, Conch. Icon. xv., *Cerithidea*, t. 1. fig. 3 [2]; Mörch, Malak. Blätt. xxiii. p. 87 [3].

Cerithium (*Cerithidea*) *tenue*, Kobelt, in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, p. 181, t. 33. fig. 13 [4].

Potamides scalariformis (part.), Tryon, Manual of Conch. ix. p. 163, t. 33. fig. 76 (copied from Reeve) [5].

Conico-turrite, with deep sutures and without varices, dark brown; ribs in the whorls, except in the last two, rather strong, smooth, and a little oblique, 20 in the antepenultimate whorl—in the last two they are somewhat more feeble, a little knobbed (nodulose), and more numerous, 26 in the penultimate, 34 in the last whorl; there are usually three small knobs on each rib, the two lower ones the most distinct; three darker brown spiral bands in the last two whorls, these corresponding to the small knobs of the ribs, but not forming raised lines in the intervals between the ribs; three raised spiral lines at the lower angle of the last whorl and four or more thinner ones at the lower face of it. Outer margin of the aperture expanded and a little vaulted, but scarcely thickened; outside of a yellowish-brown colour, a little paler than the rest of the shell, inside whitish; inside of the aperture farther within dark brown.

Long. 23, diam. (incl. peristom.) 8; apert. long. 6, diam. 4 millim.

Hab. North America: Florida (*Mus. Berol.*).

S.E. Mexico: Teapa, State of Tabasco (*H. H. Smith*).

Cuba (*Pfeiffer*, *Gundlach*).

The above description is made from the single example obtained by H. H. Smith at Teapa; it agrees in all essential points with others from Cuba and Florida in the Berlin Museum. In the published descriptions and figures the difference in the form of the ribs of the last two whorls is not so clearly indicated as I find it in the specimens before me.

N.B.—*Potamides scalariformis*, Say (1825), from "the freshwater lakes of Florida"

* "Salmacidus" is a Latin adjective, used by Pliny, and meaning "a little salted"; "Salmacis" is a better-known mythological name of a nymph (Ovid, Metamorph. iv. 286 *et seq.*).

[Mörch, *loc. cit.* p. 87 ; Kobelt, t. 12. figg. 6, 7 ; Tryon, *loc. cit.* fig. 78 (original)], is a stouter shell, with a somewhat thicker peristome, but in other respects very similar, and these differences may be bridged over by examining a larger number of specimens.

II. Rhinocoryne, v. Mart.

5. Potamides pacificus.

Cerithium pacificum, Sowerby, Genera of Shells, pt. 42, t. 259. fig. 9 (1833)[1], = Reeve, Conch. Syst. ii. t. 126. fig. 9[2]; C. B. Adams, Ann. Lyc. Nat. Hist. N. York, v. p. 379 (1852)[3]; Carpenter, Report Moll. W. Coast N. Am. p. 325[4]; Kobelt, in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, *Cerithium*, p. 39, t. 8. figg. 5, 6[5].

Potamides pacificum, Mörch, Malak. Blätt. vii. p. 80 (1861)[6].

Cerithidea pacifica, Reeve, Conch. Icon. xv., *Cerithidea*, t. 1. fig. 1[7].

Cerithium humboldti, Valenciennes, in Humboldt's Obs. Zool. ii. p. 280 (1833) *[8]; Kiener, Iconogr. p. 83, t. 26. fig. 2[9].

Hab. S.W. Costa Rica: Punta Arenas, on *Rhizophoræ* (*Œrsted; C. Hoffmann, in Mus. Berol.*).

S. Panama: Panama (*Kiener*[9]; *C. B. Adams*[3], one specimen only).

Colombia: Tumaco (*Hopke, in Mus. Berol.*).

N. Peru: Arica (*Stübel, in Mus. Berol.*).

Fam. LITTORINIDÆ.

Littorina is the only genus of this family entering within our limits; the various species are essentially submarine, living chiefly on rocks at high-water mark or on mangrove-shrubs.

LITTORINA †.

Littorina, Férussac, Tabl. Syst. p. xxxiv (1821); Menke, Syn. Meth. ed. 1, pp. 24, 25 (1828); Sowerby, Genera of Shells, part 37 (c. 1831); Deshayes, in Lamarck's Hist. Nat. des Anim. sans Vert. éd. 2, ix. p. 200 (1843); Forbes & Hanley, Hist. Brit. Moll. iii. p. 25; Troschel, Gebiss d. Schnecken, i. p. 130, t. 10. figg. 13–20, t. 11. figg. 1–7 (radula), &c.

Turbo (L.), sensu strictiore, Philippi, Enum. Moll. Sicil. p. 188 (1836); Swainson, Treatise Malac. pp. 206, 207, 343 (1840).

Shell turbinated, in most of the species ovato-conoidal, thick, acutely pointed; aperture rounded below, angulated above, with broad flattened pillar-lip (area columellaris); usually imperforate. Operculum horny, paucispiral.

Living animal with projecting cylindrico-conical snout and long slender feelers, the

* Valenciennes's statement "that the specimens described by himself were found in the port of Cumana (Venezuela) by A. v. Humboldt" is probably one of the many geographical errors in this work[8].

† Some authors adopt *Litorina* and others *Littorina* for the name of this genus: philologically, both are admissible; Férussac, however, wrote "*Littorina*," and Linnæus "*Turbo littoreus*."

eyes outside their base. Foot short, broad before, attenuated behind. Radula very long. Oviparous, feeding on vegetable matter.

Living on rocks which are only moistened by the spray of the breaking waves, near or even above high-water mark, and very tenacious of life *.

The Mexican and Central-American species may be grouped into subgenera as follows :—

I. Cenchritis †, n.—Shell tuberculated, rather flattened below and minutely perforated; aperture very oblique, not distinctly angular above; columellar margin not much thickened. Operculum typical, oval, paucispiral, with a distinct angle above and rather eccentric nucleus.

Type, *L. muricata* (L.), common in the West Indies.

In the general form of the shell and the very oblique aperture this species approaches the subgenus *Tectarius*, Val. ‡, type *L. pagodus* (L.), and still more nearly to *Echinella*, Gray, type *L. cumingi*, which latter is distinctly umbilicated. But the operculum of *L. muricata* is not circular, with median nucleus, as in *Tectarius* and *Echinella*, but has the form of that of *L. littorea*, as may be seen in several specimens collected by Herr Gollmer in the Berlin Museum. *Nodilittorina*, v. Martens (1897), which is also tuberculated, with normal operculum, is distinct from *L. muricata* by the nearly perpendicular aperture, with very broad columellar margin and convex basis of the shell.

II. Littorinopsis, Mörch [Malak. Blätt. xxiii. p. 137 (1876)]; *Litorina*, section II., P. Carpenter [Cat. Mazatlan Shells, p. 351 (1857)].—Shell of moderate size; nearly smooth, with impressed spiral lines only, of brownish colour, more or less variegated. Aperture distinctly angulated above, moderately oblique, inside pale-coloured, the edge usually with dark dots.

The typical species, *L angulifera*, Lam., and the Indian *L. scabra* (L.), have a comparatively thin shell and live on the stems, branches, and leaves of mangrove-shrubs. But

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* Dr. Lister [Hist. Conch. i. 30. n. 28 (1685)] states that he has kept alive a West-Indian species, probably *L. nodulosa*, Pfr., during a whole summer in his garden, apparently far from the sea. The Papuans, in the eastern part of the Malayan Archipelago, used to keep alive another species, *L.* (*Tectarius*) *pagodus*, L., for a whole year in their chests and presumed that something was not right if the animal died earlier (Rumph, Amboinsche Rariteitkamer, 1705, p. 74).

† *Cenchritis*, fem., in Greek, a dry granulated fig, as if beset with grains of millet. Older conchologists named this shell "Reisbrei," rice-pap, on account of the minute pale tubercles.

‡ *Tectus*, Montfort [Conch. Syst. ii. p. 186 (1810)], is interpreted by Hermannsen [Indicis Generum Malac. primordia, ii. p. 532 (1847–49)] and Philippi [Handbuch, 1853, p. 175] to be founded on the type of *Littorina pagodus* (L.), and I have followed these reliable authors in working out the submarine shells of the Malayan Archipelago [in Prof. Weber's 'Zoologische Ergebnisse einer Reise in Niederlandisch Ostindien,' iv. p. 201 (1897)] and those of the East Coast of Africa [in Möbius's 'Ostafrikanische Thierwelt,' ii. p. 267 (1897)]. But on referring to Montfort's description and figure, it is clear that his type was *Trochus mauritianus*, Lam., characterized by the two spiral ridges within the aperture, although he quotes *T. pagodus*, L. P. Fischer [Manuel de Conchyliologie, p. 817] cites *T. dentatus*, Forsk., as the type of *Tectus*, Montf.; but that species wants the two ridges which Montfort notices in his description and figure.

Comparative Table of the Species of *Littorina*.

Nomen.	Forma.	Sculptura.	Coloratio externa.	Apertura intus.	Long.	Diam.	Apert.	Patria.
I. Cenchritis, *v. Mart.*								
muricata, *L.*	conoidea, subperforata, peripheria convexa.	tubercula obtusa in anfr. penult. 4–5, in ult. 9–10 series formantia.	cærulescenti-albida, tuberculis albis.	pallida, marg. columellari arcuato, modice dilatato.	mm. 18–24	mm. 13–18	mm. 8½–12	S.E. Mexico, Honduras, E. Costa Rica.
II. Littorinopsis, *Menke.*								
angulifera, *Lam.*	conoideo-ovata, basi subangulata, tenuis.	striæ spir. confertæ, in anfr. penult. c. 20, in ult. plurimæ.	fulva, rufescens vel fulvo-grisea, strigis latis obliquis, fuscis.	pallide violacea, strigis diaphanis, marg. col. rectilineo, parum dilatato.	26–37	18–23	13–20	Yucatan, E. Guatemala, Honduras, E. Costa Rica.
varia, *Sow.*	subanguste conoidea, basi angulata.	liræ validæ spir. in anfr. penult. 5–6, in ult. c. 14.	albida, lineolis obliquis interruptis fuscis.	albida, marg. ext. fusco-lineolato, marg. col. modice dilatato, subarcuato.	25–32	16–22	15½–18	W. Costa Rica, S. Panama.
fasciata, *Gray*	late conoideo-ovata, basi subangulata.	sulci spir. conferti, in anfr. penult. c. 12, in ult. c. 20.	cinerea, strigis latis fulguratis rufis vel marmorata, rarius spiratim fasciolata.	flavescens, marg. ext. fusco-lineolato, col. arcuato.	23–39	20–29	16–23	N.W. Mexico, Salvador, W. Costa Rica, S. Panama.
pulchra, *Sow.*	late conoidea, supra subangulata, basi convexa.	striæ spirales confertæ et lineæ incrementi asperulæ.	rufo-fulva, strigis fulguratis nigris.	intense fulvo-rubra, marg. col. sat dilatato, arcuato.	35–39	28–34	20–26	W. Costa Rica, S. Panama.
nebulosa, *Lam.*	conoideo-ovata, convexa.	striæ impressæ spir. leves, numerosæ.	albida, fusco-nebulosa vel violascens.	flavescens, marg. col. subrectilineo, violaceo.	16½–20	11–13	9–12	E. Mexico, Yucatan, Honduras, E. Costa Rica, N. Panama.
albida, *Phil.*	anguste ovato-conoidea, non angulata.	sulci spir. in anfr. penult. 6, in ult. 12–14.	albida, fusco-punctulata.	flavescens, marg. ext. fusco-punctulato, col. fusco-limbato.	14	8½	8	W. Nicaragua.
columellaris, *d'Orb.*	conoideo-ovata, non angulata.	striæ impressæ spir. fere obsoletæ.	pallide flava, spira fulvescente.	pallida, marg. col. subrectilin o, albo, superne violaceo.	13–20	9–15	8–12	E. Costa Rica, N. Panama.

III. MELARHAPHE, *Meg.*								
ziczac, *Chemn.*	conoideo-ovata, basi subangulata.	striæ impressæ spir. perleves, fere obsoletæ.	cærulescenti-alba, strigis fulminatis pallide fuscis.	fusca, fasciis 2 albis, marg. col. modice dilatato, rufescente.	14–20	9–11½	8–9	E. Costa Rica.
lineata, *d'Orb.*	conoidea, basi angulata.	sulci spir. distincti, c. 8 in anfr. penult., c. 10 in ult. supra angulum.	cærulescenti-grisea, strigis fuscis obliquis, undatis, zona subsuturali alba.	fusca, fasciis 2 albis, supera indistincta, marg. col. sat dilatato, pallido, fusco-limbato.	12–16½	7–10	6–8	E. Mexico, E. Costa Rica.
philippii, *Carp.*	abbreviato-conoidea, basi angulata.	sulci spir. sat distantes, c. 10 supra angulum in anfr. ult.	cærulescenti-grisea, strigis obliquis fuscis, interdum interruptis.	fusca, fasciis 2 albis, marg. ext. lineolato, col. nigro-fusco.	6½–10 (15)	5–7 (8¾)	4–4½ (7½)	N.W. Mexico, ?W. Costa Rica, S. Panama.
——, var. penicillata, *Carp.*	,,	striæ spir. leves, subinæquales.	albida, fasciolis 2 nigris spir. et strigis fuscis obliquis.	,,	10	6	5½	N.W. Mexico.
——, var. alba, *v. Mart.* ...	,,	striæ impressæ spir. lævissimæ.	nitide alba, strigis pallide fuscis tenuibus, sæpe interruptis.	pallide fusca, fasciis 2 albis, marg. col. pallido, fusco-limbato.	6½	5	4½	N.W. Mexico.
——, var. subsuturalis, *v. Mart.*	conoidea, basi angulata.	sulcus distinctus infra suturam et 3–6 supra angulum.	alba, zona lata cærulescenti-grisea, strigis fuscis obliquis vel fulminatis.	obscure fusca, fasciis 2 albis, marg. ext. fusco-guttulato, col. pallide fusco.	11½	7½	6½	W. Guatemala.
——, var. latistrigata, *v. Mart.*	,,	striæ spir. impressæ æquales, c. 9 supra angulum.	alba, strigis latiusculis nigro-fuscis, infra reticulatim confluentibus.	fusca, fasciis 2 albis, marg. col. fusco, extus magis obscuro.	11	7	6½	W. Costa Rica.
conspersa, *Phil.*	ovato-conoidea, non angulata.	sulci spirales subdistantes, in anfr. penult. c. 5, in ult. c. 10.	cærulescenti-albida, fusco-punctulata.	fusca, fasciis 2 albis, marg. ext. punctulato, col. subarcuato, fuscescente.	13	9	8	N.W. Mexico, Salvador, W. Nicaragua, W. Costa Rica, S. Panama.
——, var. puncticulata, *Phil.*	subglobose conoidea, non angulata.	sulci spir. in penult. c. 4–5, in ult. 12–14.	,,	,,	13–14	9–10	8–9	N.W. Mexico, W. Nicaragua, W. Costa Rica, S. Panama.
aspera, *Phil.*	conoideo-ovata, basi subangulata.	liræ spir. in anfr. penult. c. 10, in ult. magis elevatæ subnodulosæ c. 12.	cærulescenti-albida, strigis obliquis fuscis, in anfr. ult. sæpius in zonam nigram confluentibus.	nigro-fusca, fasciis 2 albis, marg. col. arcuato, nigro-fusco.	16–19	9–13	8–10	N.W. Mexico, Salvador, W. Costa Rica, S. Panama.

we must also include in this subgenus some forms with thick solid shells, which approach the typical ones more or less in colour and general aspect.

Atlantic coast: *L. angulifera*, Lam., *L. nebulosa*, Lam., *L. columellaris*, d'Orb.

Pacific coast: *L. pulchra*, Sow., *L. fasciata*, Gray, *L. varia*, Sow., the last-mentioned differing by a stronger sculpture.

III. Melarhaphe *, Megerle [in Menke's Syn. Moll. ed. 1, p. 23 (1828), Jan [Conspect. Test. Coll. p. 7 (1830)], P. Carpenter [Cat. Mazatlan Shells, p. 346 (1857)].—Shell of small size, with spiral striæ, mostly white, with a broad bluish or greyish zone in the middle of the last whorl, often variegated with brown oblique or zigzag streaks. Aperture scarcely oblique, distinctly angulated above, inside dark brown, usually with two white spiral bands, the upper of which is often rather indistinct.

Atlantic coast: *L. ziczac*, Chemn., *L. lineata*, d'Orb.

Pacific coast: *L. philippii*, P. Carp. (with its varieties), *L. conspersa*, Phil., *L. aspera*, Phil., the last-mentioned differing by a stronger sculpture.

I. Cenchritis, v. Mart.

1. Littorina muricata.

Buccinum sublividum striis nodosis, &c., Lister, Hist. Conch. t. 30. fig. 28 (1685) (among the terrestrial shells) [1]; Petiver, Gazophylacium, t. 70. fig. 11 (1711) [2].

Turbo muricatus, Linn. Syst. Nat. ed. 10, p. 761 (1758) [3], ed. 13, by Gmelin, p. 3589 [4]; Chemnitz, Syst. Conch.-Cab. v. p. 170, t. 177. figg. 1752, 1753 [5]; Lamarck, Hist. Nat. des Anim. sans Vert. éd. 1, vii. p. 47 [6]; éd. 2, par Deshayes, ix. p. 199 [7].

Littorina muricata, Férussac, Tabl. Syst. pp. ix, xi (1821–22) [8]; d'Orbigny, in Sagra's Hist. fis. polit. y nat. de Cuba, Mol. i. p. 111, t. 14. figg. 9, 10 [9]; Philippi, Abbild. neuer Conch. ii. p. 142, t. 2. figg. 16, 17 [10]; Reeve, Conch. Icon. x., *Litorina*, t. 2. fig. 11 [11]; Mörch, in Malak. Blätt. xxiii. p. 134 (1876) [12]; Weinkauff, in Martini & Chemnitz's Syst. Conch.-Cab. ed. 2, *Litorina*, p. 44, t. 5. figg. 7, 8 [13].

Tectus muricata, Troschel, Gebiss der Schnecken, i. p. 136, t. 11. fig. 7 (radula) [14].

Tectarius muricatus, Tryon, Manual of Conch. ix. p. 258, t. 48. fig. 68 (copied from Reeve) [15].

For the characters of the species, see above under the subgenus *Cenchritis*, p. 575.

Hab. S.E. Mexico: Santa Ana (*Caspersen* [12]).

Honduras (*Reeve* [11]).

E. Costa Rica: Puerto Limon (*Nepperschmidt*, 1894, *Mus. Hamburg.*).

A well-known West-Indian shell, occurring in Cuba (*Pfeiffer*, *d'Orbigny* [9], *Gundlach*), Jamaica (*Lister* [1]), Haiti (*Verkrüzen*), Puerto Rico (*Sintenis*, *in Mus. Berol.*), Vieque (*Riise* [12]), St. Thomas (*Krebs* [12]), St. Croix (*Œrsted* [12]), Guadaloupe (*Beau*), Martinique (*de Candé* [9]), St. Lucia (*d'Orbigny* [9]). Also known from Cartagena, Colombia, and from Puerto Cabello, Venezuela (*Dunker*, *in Mus. Berol.*).

Dr. Pfeiffer has observed this species alive at the upper limit of the breakers, quite

* This name signifies "black suture," and refers to the fact that in some species the blue median zone appears on the upper whorls as a dark band immediately above the suture.

near to places frequented by a terrestrial shell, *Strophia maritima*, Pfr., on the Island of Cuba [Archiv für Naturg. v. p. 353 (1839)]. Krebs [12] also states that it is always found above high-water mark.

Adanson (Voyage au Sénégal, 1757) describes and figures this species as found on the shores of Senegambia, but no subsequent traveller or collector has found it on the African coast, so far as I am aware; this record, therefore, requires confirmation.

II. Littorinopsis, Mörch.

2. Littorina angulifera.

Cochlea fortiter et dense striata, Lister, Hist. Conch. iii. t. 583. fig. 37 (1688) [1].

Helix scabra (L.), Chemnitz, Syst. Conch.-Cab. xi. p. 283, t. 210. figg. 2074, 2075 [2].

Littorina scabra, Pfeiffer, Archiv f. Naturg. 1840, p. 254 [3]; d'Orbigny, in Sagra's Hist. fis. polit. y nat. de Cuba, Mol. p. 116, t. 15. figg. 15–17 [4].

Turbo striatus, Schumacher, Essai Syst. Test. p. 193 [5].

Phasianella angulifera, Lamarck, Hist. Nat. des Anim. sans Vert. éd. 1, vii. p. 24 (1822) [6]; éd. 2, par Deshayes, ix. p. 245 [7].

Littorina angulifera, Philippi, Abbild. neuer Conch. ii. p. 223, t. 5. figg. 12–15 (1847) [8]; Dunker, Index Moll. Guin. p. 13, t. 2. figg. 38, 39 [9]; Mörch, Malak. Blätt. xxiii. p. 137 (1876) [10]; Troschel, Gebiss der Schnecken, i. p. 132, t. 10. fig. 17 (radula) [11]; Weinkauff, in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, *Litorina*, p. 39, t. 4. figg. 13–15 [12] (nec *L. angulifera*, Quoy et Gaimard, Voy. Astrolabe, which = *L. scabra*, L., Phil.).

Litorina ahenea, Reeve, Conch. Icon. x., *Litorina*, t. 3. figg. 15 *b*, *c* [13].

Littorina scabra, var. *lineata* (Gmel.), Tryon, Manual of Conch. ix. p. 243, t. 42. figg. 12, 13 (copied from d'Orbigny), and 15, 16 (copied from Philippi) [14].

With crowded impressed spiral striæ; brownish, with grey or darker brown waved streaks and spots. The angular spiral ridge or keel near the base of the shell (from which this species takes its name) often nearly obsolete, and never so prominent as in the East-Indian *L. scabra*.

Hab. Yucatan (*Uhde, in Mus. Berol.*).

(East) Guatemala (*Conradt, in Mus. Berol.*).

Honduras (*Philippi* [8]).

East Costa Rica: Puerto Limon (*Biolley*).

Common in the West-Indian Islands: Cuba (*Pfeiffer* [3], *d'Orbigny* [4], *Gundlach*), Jamaica (*Lister* [1], *Verkrüzen*), Puerto Rico and St. Thomas (*Krebs*, *Riise*, *Verkrüzen*), Guadaloupe (*Beau*), Martinique (*Rang & Hotessier*).

Also occurs on the coast of Florida (*Thomson*) and in the Bermudas (*Tristram*, 1861).

On the West Coast of Africa it is known from Senegal (*Mion, in Mus. Berol.*; *Reeve* [13]), Ilha de Principe (*H. Dohrn*), Loanda (*Tams* [9], *Falkenstein*, *Mus. Berol.*).

On piles and old wood close to the shore (*Krebs* [10]). It is the Atlantic representative of the East-Indian *L. scabra* (L.), Phil. (= *Buccinum foliorum*, Rumph, 1705), which lives on the stems, branches, and leaves of mangroves.

Philippi [8] was the first conchologist who discriminated, described, and figured the

East-Indian and the West-Indian species, and it therefore seems advisable to retain the names adopted by him. The West-Indian form was identified as *lineata* by Tryon [14], who followed Mörch [10] in referring to it the shell figured by Knorr [Vergnügen der Augen, iii. t. 14. fig. 4 (1768)]; this latter was named *Buccinum lineatum* by Gmelin [in Linn. Syst. Nat. ed. 13, p. 3493 (1791)], but the figure quoted agrees better with the East-Indian *L. scabra*, the general form being more slender and the coloration more chequered than in *L. angulifera*. There is, moreover, another well-known species of *Littorina* called *lineata* by Lamarck, d'Orbigny, and Philippi. The name *striata* (Schumacher, 1817) would be more applicable to this species than *angulifera*, and also have priority; but I refrain from introducing it, as there is already a well-known *L. striata*, King (1831), = *canuriensis*, d'Orb. (1836–43), living on the Canary Islands, Madeira, and the Azores.

3. Littorina varia.

Littorina varia, Sowerby, Genera of Shells, part xxxvii. t. 228. fig. 4 (about 1831) [1], = Reeve, Conch. Syst. ii. t. 222. fig. 4 [2]; Philippi, Abbild. neuer Conch. ii. p. 99, t. 1. figg. 2, 3 [3]; C. B. Adams, Ann. Lyc. Nat. Hist. N. York, v. p. 400 (1852) [4]; Mörch, Malak. Blätt. vii. p. 69 (1860–61) [5]; Eydoux et Souleyet, Voy. Bonite, Zool. ii. p. 561, t. 31. figg. 43–45 (living animal and operculum) [6]; Reeve, Conch. Icon. x., *Litorina*, t. 4. fig. 19 [7]; Weinkauff, in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, *Litorina*, p. 53, t. 6. figg. 14, 15 [8]; Tryon, Manual of Conch. ix. p. 246, t. 43. figg. 44 (copied from Sowerby), 45 (copied from Eydoux and Souleyet) [9].

Solid, with strong spiral ridges, about five or six on the penultimate whorl and seven or eight on the last whorl, with some smaller ones between them; greyish-white, with many small dark brown or black streaks; columellar lip white.

Hab. W. Costa Rica: Punta Arenas (*Œrsted* [5], *Biolley*).

S. Panama: Panama (*Sowerby* [1 2 7]), on the trunks and branches of small trees, which were growing between half-tide and high-water levels (*C. B. Adams* [4]).

Also found in Colombia—Tumaco (*Hopke, in Mus. Berol.*); and Ecuador—Puna, near Guayaquil (*Eydoux & Souleyet* [6]).

The record of its occurrence on the shores of Peru and Chile [3] requires confirmation.

Tryon [9] quotes also *L. costulata*, Souleyet, as synonym: Eydoux and Souleyet, however, have simply used a French term, "*L. costulée*," on the plate; in the text, p. 561, they use a Latin name, *L. varia*.

4. Littorina fasciata.

Littorina fasciata, Gray, in Zoology of Capt. Beechey's Voyage, p. 139 (1839) [1]; Menke, Zeitschr. f. Malak. 1850, p. 163 [2]; Philippi, Abbild. neuer Conch. ii. p. 221, t. 5. figg. 1, 2 [3]; C. B. Adams, Ann. Lyc. Nat. Hist. N. York, v. p. 397 (1852) [4]; Carpenter, Catal. Mazatlan Shells, p. 351 [5]; Reeve, Conch. Icon. x., *Litorina*, t. 4. fig. 20, t. 18. fig. 103 [6]; Weinkauff, in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, *Litorina*, p. 40, t. 4. fig. 11 [7].

Littorina bicarinata (Wood), Mörch, Malak. Blätt. vii. p. 69 (1860–61) [8].
Littorina variegata, Eydoux et Souleyet, Voy. Bonite, Zool. ii. p. 560, t. 31. figg. 40–42 [9].
Littorina varia (Sow.), var., Tryon, Manual of Conch. ix. p. 246, t. 43. figg. 45 (copied from Reeve), 46 (copied from Eydoux and Souleyet) [10].

Broadly ovato-conical, slightly angulated and excavated below the suture, sculptured by slight spiral ridges, grey, with reddish or brown zigzag streaks.

Hab. N.W. Mexico: Mazatlan, very rare (*Melchers* [2], *Reigen* [5]).
Salvador: from brackish water on the balsam coast (*Hjalmarson*, March 1853, *in coll. Dunker*).
W. Costa Rica: Punta Arenas, on *Rhizophoræ* in company with *L. pulchra* (*Œrsted* [8]).
S. Panama: Panama, with *L. varia*, on the trunks and branches of small trees which were growing between half-tide and high-water levels (*C. B. Adams* [4]).
Also found in Colombia—Tumaco (*Hopke, in Mus. Berol.*); Ecuador—Puna, near Guayaquil (*Eydoux & Souleyet* [9]), and Balao (*Stübel, in Mus. Berol.*); and N. Peru—Tumbez (*Cuming* [3 6]).

Turbo bicarinatus, Wood [Index Testaceorum, Suppl. t. 6. fig. 47 (1828)], which is quoted as the oldest name for this species by Dr. Mörch [8], differs very much in outline from *L. fasciata*, the figure representing a shell with two distinct spiral keels; it may be an abnormal specimen?

5. Littorina pulchra.

Littorina pulchra (Swainson), Sowerby, Genera of Shells, part xxxvii. t. 228. figg. 2 (shell), 3 (operculum) (about 1831) [1], =Reeve, Conch. Syst. ii. t. 222. figg. 2, 3 [2]; Griffith, in Cuvier's Animal Kingdom, xii. p. 54, t. 1. figg. 3 (1834) [3]; Philippi, Abbild. neuer Conch. ii. p. 10, t. 1. fig. 1 [4]; C. B. Adams, Ann. Lyc. Nat. Hist. N. York, v. p. 398 (1852) [5]; Mörch, Malak. Blätt. vii. p. 68 (1860) [6]; Reeve, Conch. Icon. x., *Litorina*, t. 3. fig. 17 [7]; Tryon, Manual of Conch. ix. p. 246, t. 43. fig. 47 (copied from Reeve) [8]; Weinkauff, in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, *Litorina*, p. 49, t. 6. figg. 6, 7 [9].
Turbo pulchra, Swainson, Treat. of Malac. p. 207, fig. 39 (1840) [10].
Turbo zebra, Donovan, Naturalist's Repository, iii. t. 131 (1834) [11].

Solid, broadly ovate, of a reddish-brown colour, with black zigzag streaks; aperture dull orange.

Hab. W. Costa Rica: Punta Arenas, in the Gulf of Nicoya (*C. Hoffmann, in Mus. Berol.; Biolley, in Mus. Neufchâtel; Œrsted*).
S. Panama: Panama, on mangrove-trees in a very dense thicket, which was growing from a soil of black unctuous mud, a little below high-water mark (*C. B. Adams* [5]).
Occurs also in Colombia—Tumaco (*Hopke & Deybrich, in Mus. Berol.*); S. Peru—Arica (*Stübel, in Mus. Berol.*).

6. Littorina nebulosa.

Phasianella nebulosa, Lam. Hist. Nat. des Anim. sans Vert. éd. 1, vii. p. 54 [1]; éd. 2, par Deshayes, ix. p. 244 [2]; Delessert, Recueil des Coquilles de Lamarck, t. 37. fig. 12 [3].

Littorina nebulosa (Lam.), Philippi, Abbild. neuer Conch. ii. p. 225, t. 5. fig. 20[4]; Mörch, Malak. Blätt. xxiii. p. 136 (1876)[5]; Reeve, Conch. Icon. x., *Litorina*, t. 11. fig. 55[6].

Littorina scabra, var. *nebulosa*, Tryon, Manual of Conch. ix. p. 244, t. 43. fig. 38 (copied from Reeve)[7].

Litorina angulifera, var. *minor*, Weinkauff, in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, *Litorina*, p. 39[8].

Rather thin, with feeble spiral striæ, whitish, with reddish or brown clouds and streaks; columellar lip pink. Whorls not so convex as in *L. angulifera*, but flattened above.

Hab. E. Mexico, Vera Cruz (*Uhde, in Mus. Berol.*).

Yucatan: Carmen Island (*Uhde, in Mus. Berol.*).

Honduras (*Cuming*[4 5 6]).

E. Costa Rica: Puerto Limon (*Biolley*).

N. Panama: Chagres (*Krebs*[5]).

Also widely distributed in the West-Indian Islands: Cuba (*Pfeiffer & d'Orbigny*: Littorina tigrina), Jamaica (*Carpenter*[5]), Haiti (*Richard*[1 5]), Guadaloupe (*Hoitessier*); and occurring in Venezuela—Puerto Cabello (*Tams*), Cayenne[4], &c.

Krebs found it in clusters on wood lying on the beach at high- and low-water mark[5].

7. Littorina albida.

Littorina albida, Philippi, Abbild. neuer Conch. iii. p. 63, t. 7. fig. 9 (1848)[1]; Weinkauff, in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, *Litorina*, p. 81, t. 11. fig. 1 (copied from Philippi)[2].

Littorina aspera, var., Tryon, Manual of Conch. ix. p. 249, t. 44. fig. 81 (copied from Weinkauff)[3].

Hab. W. Nicaragua: Realejos (*Petit*[1]).

According to Philippi[1], this species resembles in coloration *L. conspersa* and *L. puncticulata* of the same coast, but seems really nearer the Atlantic *L. nebulosa*, by the form of the whole shell and by that of the aperture. I have not seen a specimen of it.

8. Littorina columellaris.

Littorina columellaris, d'Orbigny, Voy. Am. mér., Moll. p. 392 (1835–43)[1]; in Sagra's Hist. fis. polit. y nat. de Cuba, Mol. p. 116, t. 15. figg. 18–20[2]; Philippi, Abbild. neuer Conch. ii. p. 226, t. 5. fig. 19 (not 21)[3]; Küster, in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, *Litorina*, p. 24, t. 3. figg. 16–18[4]; Reeve, Conch. Icon. x., *Litorina*, t. 17. fig. 97[5]; Tryon, Manual of Conch. ix. p. 245, t. 43. fig. 37 (copied from Reeve) (excl. ceteris figuris)[6].

Hab. E. Costa Rica: Costa Rica (*v. Seebach*).

N. Panama: Colon, on wooden piles on the beach (*Oswald*, 1892, *in Mus. Hamburg.*).

Also in the West Indies: Guadaloupe (*Beau*) and Martinique (*de Candé*[2]); and on the coasts of Venezuela and Northern Brazil (*d'Orbigny*[1 3 4]).

III. Melarhaphe, Megerle.

9. Littorina ziczac.

Cochlea sublivida, nigris lineis undatis, Lister, Hist. Conch. iv. t. 583. fig. 38 (1688) [1].

Trochus ziczak, Gmelin, Linn. Syst. Nat. ed. 13, p. 3587 [2]; Chemnitz, Syst. Conch.-Cab. v. p. 69, t. 166. fig. 1599 [3].

Litorina ziczac, Pfeiffer, Krit. Register zu Martini & Chemnitz, p. 40 (1840) [4]; Philippi, Abbild. neuer Conch. ii. p. 162, t. 3. figg. 13, 14 [5]; d'Orbigny, in Sagra's Hist. fis. polit. y nat. de Cuba, Mol. p. 114, t. 15. figg. 5, 7, 8 [6]; Mörch, Malak. Blätt. xxiii. p. 137 (1876) [7]; Küster, in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, *Litorina*, p. 22, t. 3. figg. 9–11 [8]; Reeve, Conch. Icon. x., *Litorina*, t. 11. fig. 57 *a*, *b* [9].

Littorina ziczac, light-coloured, larger variety, Tryon, Manual of Conch. ix. p. 251, t. 45. fig. 5 (copied from Reeve) [10].

Phasianella lineata, Lamarck, Hist. Nat. des Anim. sans Vert. éd. 1, vii. p. 57 [11]; éd. 2, par Deshayes, ix. p. 243 [12]; Delessert, Recueil de Coquilles de Lamarck, t. 37. fig. 11 [13].

Nearly smooth, impressed spiral lines only to be seen under a strong lens in the lower part above the very obtuse basal angle; of larger size and of fuller rounded shape than *L. lineata*.

Hab. E. Costa Rica: Puerto Limon (*Biolley*).

Common in the West-Indian Islands: Cuba (*Otto, d'Orbigny* [2], *Gundlach*), Jamaica (*Lister* [1]), Haiti (*v. Maltzan*), St. Thomas (*Gollmer & Verkrüzen*), St. Croix (*Œrsted, Riise*), Guadaloupe (*Beau*), Martinique (*de Candé* [6]), Barbados (*Lister* [1]).

Occurs also on the northern coast of South America: Puerto Cabello, Venezuela (*Tams & Moritz*), and in the Bermudas (*Tristram*, 1861).

Littorina orbignyana, Philippi [*loc. cit.* p. 162, t. 3. fig. 12; *L. zigzag*, d'Orbigny, *loc. cit.* fig. 6], from Cuba, is probably an individual variation with a little more distinct spiral lines.

10. Littorina lineata.

Trochus ziczac, var., Chemnitz, Syst. Conch.-Cab. v. p. 69 (part.), t. 166. fig. 1600 (not 1599) [1].

Trochus ziczak, *β*, Gmelin, Linn. Syst. Nat. ed. 13, p. 3587 [2].

Littorina lineata, d'Orbigny, in Sagra's Hist. fis. polit. y nat. de Cuba, Mol. p. 113, t. 14. figg. 24, 27 [3]; Philippi, Abbild. neuer Conch. ii. p. 163, t. 3. fig. 18 [4]; Küster, in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, *Litorina*, p. 23, t. 3. figg. 12–15 [5] [nec *lineata*, Lam. (*Phasianella*), nec *lineata*, Gmelin (*Buccinum*)].

Littorina floccosa (Beck), Mörch, Malak. Blätt. xxiii. p. 138 (1876) [6].

Oblong-conical, greyish, with oblique dark brown or blackish streaks; distinctly furrowed spirally.

Hab. E. Mexico: Vera Cruz (*Uhde, in Mus. Berol.*); Mexican Gulf, without nearer indication of locality (*Deppe, in Mus. Berol.*).

E. Costa Rica: Puerto Limon (*Biolley*).

Occurs also in the West-Indian Islands: Cuba (*d'Orbigny* [3], *Otto*), St. Thomas (*Riise, Œrsted, Krebs, Gollmer, Verkrüzen*), Guadaloupe (*Beau*), and Martinique (*de Candé* [3]); and on the coast of Venezuela, at Puerto Cabello (*Tams, in coll. Dunker; Gollmer, in Mus. Berol.*).

11. **Littorina philippii.** (Tab. XLIII. fig. 12.)

Litorina philippii, Carpenter, Catal. Mazatlan Shells, p. 349 (1857) [1]; Mörch, in Malak. Blätt. vii. p. 69 (1860–61) [2]; Weinkauff, in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, *Litorina*, p. 104 [3] (nec *L. philippiana*, Reeve, Conch. Icon. x., *Litorina*, t. 3. fig. 22, from the Philippines, and therefore better written *philippina*).

Littorina parvula (Philippi ?), C. B. Adams, Ann. Lyc. Nat. Hist. N. York, v. p. 398 (1852) [4]; Carpenter, Moll. W. N. Am. p. 188 (1872) [5]. [See also *infrà*, p. 586.]

Littorina aspera, var. *philippii*, Tryon, Manual of Conch. ix. p. 249, t. 44. fig. 84 [6].

Very small, the last whorl comparatively large, with impressed spiral striæ, about 10 between the suture and the basal angle; greyish-white or plainly white, with rather pale brown oblique and slightly waved streaks, which are often interrupted at the spiral striæ.

a. Long. 10, diam. 7, apert. ? millim.
b. „ $6\frac{1}{2}$, „ 3, „ $4\frac{1}{2}$ „
c. „ 15, „ $8\frac{3}{4}$, „ $7\frac{1}{2}$ „

a and *c*. Dimensions given by Carpenter [1], reduced to millimetres, *c* an extraordinarily large specimen; *b*. Specimen from Mazatlan, given by Forrer.

Hab. N.W. Mexico: Mazatlan, common (*Reigen* [1]; *G. A. Ringe, in Mus. Hamburg.*; *Forrer, coll. Dunker*).

? W. Costa Rica: Punta Arenas, one specimen (*Œrsted* [2]).

S. Panama: Taboga Island and Panama, in the cavities of rough ledges of rocks at and above high-water mark (*C. B. Adams* [4 5]).

This species approaches *L. lineata* of the Atlantic coast, but may be distinguished from it by the blunter form, the aperture occupying usually more than half the whole shell. The colour is somewhat variable according to Carpenter [1], "livida" or "olivaceo-livida," the streaks olive-brown, almost always in slanting lines more or less interrupted; in the specimens collected by Ringe it is greyish-white, somewhat darker on the lower half of the surface between suture and basal angle of the last whorl (this being the common coloration of *L. lineata*), the streaks either pale brown or, in some specimens, dark brown, oblique, and slightly waving. From *L. aspera* it differs in the much fainter sculpture, but as in that species the upper whorls are not so strongly sculptured as the last one, it is sometimes difficult to determine specimens when they are not full-grown (see Carpenter [1]).

Var. *penicillata*. (Tab. XLIII. fig. 14.)

Litorina philippii, var. *penicillata*, Carpenter, Ann. & Mag. Nat. Hist. (3) xiii. p. 477 (1864) [7]; Moll. W. N. Am. pp. 104, 216 [8].

Littorina aspera, var. *penicillata*, Tryon, Manual of Conch. ix. p. 250, t. 44. fig. 85 [9].

Spiral striæ much fainter, only visible under a strong lens. Most specimens white, with pale brown, oblique, slightly waved streaks, and two well-defined narrow blackish spiral bands, the one above, the other below the basal angle of the last whorl.

a. Long. 10, diam. 6, long. apert. $5\frac{1}{2}$ millim.
b. „ $11\frac{1}{2}$, „ 7, „ 6 „

a. Ordinary size; *b*. The largest among many specimens.

Hab. Lower California, especially at La Paz (*Forrer, in Mus. Berol.*); Cape San Lucas (*Xantus*).

N.W. Mexico: Mazatlan, one specimen (*Ringe*).

In general appearance this form, except for the two bands, comes very near the var. *alba* of *L. philippii*, obtained by the same collector, Forrer, at Mazatlan. The upper band is placed on the last whorl in the position where the white and grey colours join in *L. lineata* and in many Mazatlan examples of *L. philippii*. In one of the latter, among many collected by Ringe in that locality, two spiral bands are visible, but the spiral striæ are somewhat deeper than in the Californian specimens; this example, therefore, forms a connecting-link between the variety *penicillata* and the typical *L. philippii*. It is somewhat remarkable that Carpenter[1], who examined many specimens, does not mention any with spiral bands among the colour-varieties enumerated by him.

Var. *alba*, n. (Tab. XLIII. fig. 13.)

Of small size and shining pure white, with very pale, thin, brownish streaks, which are sometimes interrupted. Impressed spiral lines very faint. Interior of the aperture pale brown; pillar-lip also pale, but outwardly marked with a dark brown streak.

Long. $6\frac{1}{2}$, diam. 5, apert. $4\frac{1}{2}$ millim.

Hab. N.W. Mexico: Mazatlan (*Forrer, in Mus. Berol.*).

Var. *subsuturalis*, n. (Tab. XLIII. fig. 17.)

A deeper spiral furrow below the suture, and some 3–6 other furrows above the angle of the last whorl; colour white below the suture, and bluish-grey on the lower half between the suture and the angle of the last whorl, the two portions thus coloured with oblique, or more rarely zigzag, brownish streaks; interior of the aperture dark brown, with the usual two white bands; edge of the aperture with dark dots. The general form more conical, not so blunt as in the typical form, the aperture occupying rather more than half the length of the shell.

Long. $11\frac{1}{2}$, diam. $7\frac{1}{2}$, apert. $6\frac{1}{2}$ millim.

Hab. W. Guatemala: San José, on the iron piles of the pier (*Stoll*).

In the general form of the shell this variety is more like the Atlantic *L. lineata* than the typical *L. philippii*; it has, however, a very distinct furrow below the suture, as in some Californian specimens of *L. philippii*, a character not found in *L. lineata*, so far as I know.

Var. *latistrigata*, n. (Tab. XLIII. fig. 18.)

White, with rather broad dark brown or black streaks, which run parallel in an oblique direction, or are a little waved in the upper half of the space between the suture and the basal angle, intermingling in an irregular network, leaving only small white intervals in the lower half; in the upper whorls this zone is even often uniformly black. About nine equal, faint, impressed spiral lines between the suture and the angle. Interior of the aperture with the usual two white bands; pillar-lip brown in the middle, darker outwards. General form of the shell very like that of the var. *subsuturalis*.

Long. 11, diam. 7, apert. $6\frac{1}{2}$ millim.

Hab. W. Costa Rica: Punta Arenas (*Biolley*).

Also very near the Atlantic *L. lineata*, with which I should have placed it, had it not been for the western habitat. It is more convenient, however, to treat the Atlantic *L. lineata* and the Pacific *L. philippii* as separate species, as they do not quite agree.

L. parvula, Philippi [Zeitschr. f. Malak. 1848, p. 149], found by E. B. Philippi, brother of the well-known conchologist, at Panama, belongs perhaps to the same or to a nearly allied form, as it is described as having black waved streaks, a character not possessed by any other Pacific *Littorina* known to me.

12. Littorina conspersa.

Littorina conspersa, Philippi, Abbild. neuer Conch. ii. p. 200, t. 4. fig. 14 [1]; C. B. Adams, Ann. Lyc. Nat. Hist. N. York, v. p. 396 (1852) [2]; Carpenter, Catal. Mazatlan Shells, p. 346 [3]; Mörch, Malak. Blätt. vii. p. 69 (1860–61) [4]; Weinkauff, in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, *Litorina*, p. 64, t. 8. figg. 10, 11 [5].

Littorina modesta, Menke, Malak. Blätt. 1850, p. 164 (nec Philippi, 1845) [6].

Littorina aspera, var. *conspersa*, Tryon, Manual of Conch. ix. p. 249, t. 44. fig. 82 (copied from Weinkauff) [7].

Conoid-oval, with flat spiral ridges, separated by narrow furrows; bluish-white, with numerous small black dots of unequal size.

Hab. N.W. Mexico: Mazatlan (*Melchers & Liebmann* [6], *Reigen* [3]).

Salvador; Libertad (*Krause*, 1881, *in Mus. Berol.*).

W. Nicaragua: Realejos (*Petit* [1], *Hinds* [3]).

W. Costa Rica: Punta Arenas, on stones (*Œrsted* [4]).

S. Panama: Panama, on large fragments of rock at high-water mark (*C. B. Adams* [2]).

Var. *puncticulata*.

Littorina puncticulata, Philippi, Abbild. neuer Conch. ii. p. 201, t. 4. fig. 15 [8]; C. B. Adams, Ann. Lyc. Nat. Hist. N. York, v. p. 400 (1852) [9]; Weinkauff, in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, *Litorina*, p. 63, t. 8. fig. 9 (copied from Philippi) [10].

Littorina conspersa, var. *puncticulata* (Phil.), Carpenter, Catal. Mazatlan Shells, p. 346 [11]; Mörch, Malak. Blätt. vii. p. 69 (1860–61) [12].

Littorina aspera (part.), Tryon, Manual of Conch. ix. p. 249, t. 44. fig. 83 (copied from Weinkauff) [13].

More globose, the aperture occupying distinctly more than half the whole length, in some specimens two-thirds of it, and with somewhat stronger spiral ridges. Probably only an individual variation.

Hab. N.W. Mexico: Mazatlan (*Reigen* [11]).

W. Nicaragua: Realejos (*Petit* [8]).

W. Costa Rica: Punta Arenas, with the typical form (*Œrsted* [12]).

S. Panama: Taboga Island, on fragments of rock at high-water mark (*C. B. Adams* [9]).

According to Philippi's description and figure [8], *L. puncticulata* differs from

L. conspersa in two characters, viz., the more globose form and the more elevated ridges; but among the Mazatlan specimens in the Berlin Museum there are several which combine the slender form of *conspersa* with the strong ridges of *puncticulata*.

13. **Littorina aspera.** (Tab. XLIII. figg. 15, 16.)

Littorina aspera, Philippi, P. Z. S. 1845, p. 139[1]; Abbild. neuer Conch. ii. p. 200, t. 4. fig. 13[2]; Menke, Zeitschr. f. Malak. 1847, p. 178[3], and 1850, p. 163[4]; C. B. Adams, Ann. Lyc. Nat. Hist. N. York, v. p. 394 (1852)[5]; Carpenter, Catal. Mazatlan Shells, p. 348[6]; Küster, in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, *Litorina*, p. 61, t. 8. figg. 2, 3[7]; Mörch, Malak. Blätt. vii. p. 69 (1860–61)[8]; Troschel, Gebiss d. Schnecken, i. p. 137, t. 11. fig. 4 (radula)[9]; Tryon, Manual of Conch ix. p. 249, t. 45. fig. 87 (copied from Reeve)[10].

Littorina apicina, Menke, Zeitschr. f. Malak. 1850, p. 164 (young state)[11].

Litorina irrorata (Say), Reeve, Conch. Icon. x., *Litorina*, t. 11. fig. 56[12] (nec *L. irrorata*, Say, from the east coast of North America).

Near *L. lineata*, but with the spiral ridges stronger and somewhat rough; the last whorl usually differing from the upper ones in having the spiral ridges more prominent and somewhat knobbed; the basal keel more distinct in younger specimens, but sometimes almost disappearing in very old ones (fig. 16).

Hab. N.W. Mexico: Mazatlan, common (*Melchers*[3 4 8], *Reigen*[6]); West Coast of Mexico (*Uhde, in Mus. Berol.*); Mexico, without nearer indication of locality (*Hegewisch*[1 2]).

Salvador: Conchagua (*Cuming*[1 2]); La Libertad (*Krause*, 1881, *in Mus. Berol.*).

W. Costa Rica: Punta Arenas, on stones (*Œrsted*[8]); Gulf of Nicoya (*C. Hoffmann, in Mus. Berol.*).

S. Panama: Taboga Island and Panama, on ledges and large fragments of rock at or above high-water mark (*C. B. Adams*[5]).

Our figures are taken from a very old specimen, 19 millim. in length, in Paetel's collection (fig. 15), and from a young one from Nicoya (fig. 16).

Carpenter[6] is quite right, I think, in doubting the occurrence of this species so far north as Sitka, whence it has been recorded by Philippi[1 2]. Von Middendorff [Malacologia Rossica, p. 66] has seen no specimen from thence in the Petersburg Museum, but mentions it only on the authority of Philippi.

The other species of *Littorina* mentioned by C. B. Adams in his valuable 'Catalogue of Panama Shells' live in somewhat deeper water, between half-tide and high-water levels (*L. atrata*), or have been found only as dead shells in sand, and they belong to the genus *Fossarus*, according to Carpenter (Moll. W. N. Am. p. 188).

Littorina aberrans, Philippi (P. Z. S. 1845, p. 142; Abbild. neuer Conch. iii. p. 11, t. 6. fig. 9; Reeve, Conch. Icon. x., *Litorina*, t. 12. fig. 59), from Panama, founded on a single specimen in Cuming's collection, probably does not belong to this genus also; Carpenter (Moll. N.W. Am. p. 60), however, says that it is a tall variety of *L. conspersa*,

which, judging from the description and figure, I cannot believe. The type was found on the rocks at half-tide level.

Littorina scabra (L.) [Rumph, Amb. Rariteitkamer, t. 29. fig. Y (1705); Philippi, Abbild. neuer Conch. ii. t. 5. figg. 3–5 ; v. Martens, in M. Weber's Zool. Ergebnisse Reise Niederl. Indien, iv. p. 194], a characteristic Malayan form, is quoted by Tryon (Manual of Conch. ix. p. 243) as occurring also at Mazatlan. I cannot find any reliable record of this species, or of the nearly allied *L. angulifera*, Lam., from the West Coast of America.

Tectarius coronatus, Valenciennes, in Humboldt's Obs. Zool. ii. p. 271, said to have been found in the port of Acapulco, is, according to the description, evidently synonymous with *Littorina* (*Tectus*) *bullata*, Martyn, = *papillosa*, Lam. (Philippi, Abbild. neuer Conch. ii. t. 2. figg. 2, 7 ; Reeve, Conch. Icon. x., *Litorina*, t. i. fig. 1), a species living on the coast of the Philippines (*Jagor, in Mus. Berol.*), and also in the Indian seas. *Nanina ovum*, another species described in Alex. v. Humboldt's work, was also supposed at one time to be Mexican ; both shells were, no doubt, imported from Manila.

The freshwater species of the following genera have already been dealt with in the preceding pages :—

NERITINA.

For the characters of this genus, its subgenera, and the comparative table of the species, see *anteà*, pp. 465–468 ; we have to deal here with the submarine or salt-water forms only, which come under the heading " c. Species submarinæ " * :—

7. **Neritina virginea.**

Buonanni, Ricreazione dell' occhio, etc., pars iii. figg. 197, 198, 200, 203, 204, 205 (1681) [1].

Nerita quasi squamosus, Lister, Hist. Conch. iii. t. 606. figg. 32, 35–39 [2].

Nerita virginea, Linn. Syst. Nat. ed. 10, p. 778 [3] ; Hanley, in Linn. Conch. p. 402 [4].

Neritina virginea, Lamarck, Hist. Nat. des Anim. sans Vert. éd. 1, vi. 2, p. 187 (1822) [5]; éd. 2, par Deshayes, viii. p. 516 [6] ; d'Orbigny, in Sagra's Hist. fis. polit. y nat. de Cuba, Mol. p. 174 [7] ; Voy. Am. mér. v. p. 406, t. 56. figg. 1–3 (living animal) [8] ; v. Mart. in Malak. Blätt. xii. p. 62 (1865) [9] ; ibid. in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, *Neritina*, p. 122, t. 14. figg. 13–17 [10] ; Tate, Amer. Journ. of Conch. v. p. 153 (1870) [11] ; Strebel, Beitr. Mex. Land- und Süssw.-Conch. i. p. 62, t. 1. fig. 40 [12] ; Troschel, Gebiss d. Schnecken, ii. p. 181, t. 16. fig. 19 (radula) [13] ; Pilsbry, Nautilus, xiii. p. 139 [14].

Neritina elegantissima, Hartmann, Gastropoden d. Schweiz, p. 198, tt. 77, 78 [15].

Neritæ fluviatiles Indiæ occidentalis, Chemnitz, Syst. Conch.-Cab. ix. p. 72, t. 124. figg. 1088 *a–l* [16].

Hab. E. Mexico : Isla verde, near Vera Cruz, a coral island in a pool formed by rain-water and filled with algæ, copiously (*Strebel* [12]) ; Vera Cruz (*Friedel* [9]).

S.E. Mexico : Pueblo " La Ceiba " in Tabasco (*Rovirosa* [14]).

Yucatan : Laguna de Terminos (*Morelet, Strebel* [12]).

* See p. 555.

British Honduras: Belize (*Morelet, Bocourt*); same locality, on piles in the ditches of the town (*Stoll*).

Honduras (*Dyson*).

S.E. Nicaragua: Punta Arena, near Greytown, on sandy bottoms in brackish-water pools, with *Cyrena solida*, very abundant (*Tate* [11]).

E. Costa Rica: Sable Creek and Boca del Toro (*Tate* [11]).

Also found in Florida (*Dall, Lönnberg*); the West-Indian Islands: Cuba (*Pfeiffer, d'Orbigny* [7], *Gundlach*), Jamaica (*Browne, C. B. Adams*), Haiti (*Lamarck* [6]), Puerto Rico, Vieque, and St. Thomas (*Blauner*), Guadaloupe (*Beau*), Martinique (*de Candé, Mazé*), Barbados (*Lister* [2]), Antigua (*Tarves*), Trinidad (*Guppy*); and in South America: Colombia—Rio Hacha (*Sievers*), Venezuela—Puerto Cabello (*Tams*), Cayenne (*Deplanche, ap. Drouet*), Pernambuco (*Buonanni* [1]; *de Fontane, ap. d'Orbigny* [8]), Bahia (*Blanchet, ap. Moricand*), Rio Janeiro (*d'Orbigny* [8]), S. Paulo (*v. Ihering*), Santa Catarina (*Fritz Müller*).

8. **Neritina picta.** (Tab. XXVIII. figg. 8, 10, 13.)

Neritina picta, Sowerby, P. Z. S. 1832, p. 201 [1]; Conch. Illustr. no. 35, fig. 1 [2]; Thes. Conch. ii. p. 530, t. 110. figg. 267, 269 [3]; Deshayes, in Lamarck's Hist Nat. des Anim. sans Vert. éd. 2, viii. p. 388 [4]; Menke, Zeitschr. f. Malak. 1850, p. 167 [5]; C. B. Adams, Ann. Lyc. Nat. Hist. N. York, v. p. 430 (1852) [6]; Reeve, Conch. Icon. ix., *Nerita*, t. 23. fig. 102 [7]; Carpenter, Catal. Mazatlan Shells, p. 259 [8]; Moll. W. N. Am. p. 541 [9]; Mörch, Malak. Blätt. vii. p. 170 (1861) [10]; Troschel, Gebiss d. Schnecken, ii. p. 176, t. 16. fig. 9 (radula) [11]; v. Mart. in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, *Neritina*, p. 191, t. 19. figg. 22, 23 [12]; Miller, Malak. Blätt. n. ser. i. p. 167 (1879) [13].

Neritella picta, Binney, Land and Freshw. Shells of N. Am. iii. p. 105, fig. 211 [14].

Neritina usurpatrix, Fisch. & Crosse, Journ. de Conch. xi. p. 293 (1892) [15]; Miss. Scient. Mex., Moll. ii. p. 486 [16].

One of the most handsomely-coloured species of *Neritina*, yellowish, with white or bluish-white, black-bordered, oblique streaks; columellar plain brownish-red. The streaks in most specimens nearly uniform over the whole surface, but in others very unequal in size and number, sometimes scarcely conspicuous or even wanting here and there, but always present near the aperture.

Diam. maj. 13½, min. 10; alt. 14, marg. col. 8, lat. areæ 4 millim.
„ 11, „ 8½; „ 10, „ 6, „ 4½ „

Hab. Lower California: La Paz (*Major Rich*, 1846–48 [12]).

N.W. Mexico: Guaymas, Sonora (*Webb* [12]); Mazatlan (*Melchers* [5], *Reigen* [8 9 14]).

Salvador: La Union (*Sallé* [16]).

S.W. Costa Rica: Salinas Bay (*Pittier*, 1891); Punta Arenas (*Œrsted* [10]); Nicoya (*Hoffmann* [12]); Boca Sierpe (*Pittier*).

S. Panama: Panama, in abundance on a mud bank, covered at times with fresh water (*Cuming* [1–4], *C. B. Adams* [6]); Gulf of San Miguel (*Lieut. Green* [12]).

Ecuador: Guayaquil (*Wolf* [13]).

Northern Peru: Payta (*Philippi jun., in coll. Dunker*).

The following seem to be individual variations in colour, rather than geographical varieties of *N. picta*; but as they have been distinguished and named by K. Miller, we may mention them here :—

Var. *luteofasciata.*

Neritina picta, v. Mart. loc. cit. figg. 24, 25 [17].
Neritina picta, var. γ. *luteofasciata*, Miller, loc. cit. p. 168 [18].

Near the suture and in a spiral zone lower down grey, the intervening space yellow, the grey and yellow portions each marked with the characteristic white or bluish black-bordered lines.

Hab. N.W. Mexico, Mazatlan (*coll. Dunker*); Panama (*coll. Paetel*).—Ecuador, Guayaquil (*Wolf*).

Var. *nigrofasciata.*

Neritina picta, var. with black sutural band, Carpenter, loc. cit. p. 261 [19].
Neritina picta, var. ε. *nigrofasciata*, Miller, loc. cit. p. 168 [20].

With one or two black spiral bands, the upper one near the suture, the other in the lower half of the last whorl; the intervening space with the characteristic lines.

Hab. N.W. Mexico, Mazatlan (*Reigen, coll. Dunker*); Panama (*coll. Paetel*).—Ecuador, Guayaquil (*Wolf*).

Var. *guttata.*

Neritina picta, var. β. *guttata*, Miller, loc. cit. p. 168 [21].

The streaks reduced to small spots.

Hab. Costa Rica (*Pittier*).—Ecuador, Guayaquil (*Wolf*); Peru, Payta (*Philippi*).

Var. *serta*, n. (Tab. XXVIII. fig. 13.)

With white, black-bordered small spots in two or three spiral zones, otherwise uniformly yellowish.

Hab. N.W. Mexico, Mazatlan (*coll. Dunker*); Costa Rica (*v. Seebach*); Panama (*coll. Paetel*).—Ecuador, Guayaquil (*Wolf*); Peru, Payta (*Philippi*).

Var. *subnigra*, n.

Almost uniformly black on the dorsal face.

Hab. Costa Rica (*Seebach, Pittier*).—Ecuador, Guayaquil (*Wolf*).

The columellar margin is not so conspicuously sinuated in its middle part as in most other species of the subgenus *Clithon*, but it has also a smaller number of teeth, ordinarily seven, and the two apophyses of the operculum are united by a septum-like wall.

This species seems to be truly marine. C. B. Adams [6] states that he has found it on wood and stones, as well as on moss-like weed, at marshy spots between high and low water, and he calls it "strictly marine." Cuming is said [1] to have collected it in abundance on a mud-bank covered at times with fresh water. Miller [13] says that

Dr. Wolf found it in salt water. Pittier found it in Costa Rica on the banks of a stream submerged at high water.

N.B.—There is an older fossil *N. picta*, Férussac, Hist. Nat. Moll. Terr. et Fluv. Fossiles, t. 2. figg. 4–7, Explication des Planches, p. 22, without description, published, according to Fischer and Crosse [16], in 1825, and adopted by Grateloup in 1827 and Eichwald in 1830. But as the fossil species was renamed *N. ferussaci* by Récluz in 1850 (Journ. de Conch. i. p. 154), and that of the recent one has been adopted by all subsequent authors, from 1832 to 1892, I prefer to follow the latter.

9. Neritina fontaineana.

Neritina fontaineana, d'Orbigny, Voyage Amér. mér., Moll. ii. p. 406, t. 76. figg. 14, 15 (1837–40) [1]; v. Mart. in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, *Neritina*, p. 75 [2].

Neritina guayaquilensis, Sowerby, Thes. Conch. ii. p. 520, t. 114. fig. 177 (1849) [3]; C. B. Adams, Ann. Lyc. Nat. Hist. N. York, v. p. 430 (1852) [4]; Reeve, Conch. Icon. ix., *Nerita*, t. 23. no. 104, fig. 103 *b* [5]; Carpenter Rep. Brit. Assoc. 1856, pp. 274, 322 [6]; Stearns, Proc. U.S. Nat. Mus. iv. p. 332 (1891) [7].

Shell subglobose, smooth, greenish, with black network and a broad dark band; spire obtuse; aperture broadly semilunar, yellowish. Diam. maj. 13–16, alt. 15–16, height of the aperture 12 millim.

Hab. S. Panama: Panama, a little above highest tides, among sticks and leaves, in a muddy place overflowed with fresh water (*C. B. Adams* [4]).

Ecuador: Guayaquil, in brackish or salt water in the mouth of the river of the same name (*Fontaine* [1], *Cuming* [3 5]).

The habitat Payta, Peru, probably appertains to this species, but the other localities (*Dr. Jones* [7]) mentioned by Stearns [7], Bay of Montijo and Gulf of Nicoya, belong to *N. latissima*, var. *intermedia* (see *anteà*, p. 469).

As the form of the operculum of *N. fontaineana* is not known, it is uncertain whether the species is nearest allied to *N. virginea* or to *N. picta*.

The following marine species of *Neritina* have still to be noticed, but further information is required about both of them before they can be treated as belonging to the mainland fauna of Mexico or Central America:—

Neritina pupa.

Nerita exiguus nigrolineus ore subcroceo, Lister, Hist. Conch. t. 605. fig. 31 (1688) [1].

Nerita pupa, Linn. Syst. Nat. ed. 10, p. 378 [2].

Neritina pupa, Sowerby, Conch. Illustr. no. 45, fig. 30 [3]; Thes. Conch. ii. p. 530, t. 111. fig. 69 [4]; Deshayes, in Lamarck's Hist. Nat. des Anim. sans Vert. éd. 2, viii. p. 587 [5]; Reeve, Conch. Icon. ix. fig. 63 [6]; v. Mart. Malak. Blätt. xii. p. 65 (1865) [7]; ibid. in Martini & Chemnitz, Syst. Conch.-Cab., *Neritina*, p. 130, t. 2. figg. 11–13, t. 14. figg. 25, 26 [8]; Fisch. & Crosse, Miss. Scient. Mex., Moll. ii. p. 488 [9].

H. Uhde, who lived for some time in Mexico, had a specimen of this species in his collection ([7] [8]), without indication of locality; this collection, however, also included a number of Cuban shells, and there is no reliable evidence that he found it in Mexico, as Fischer and Crosse [9] suggest.

For fuller synonymy, see v. Martens [8] and Fischer and Crosse [9].

Neritina (Smaragdia) viridis.

Nerita viridis, Linn. Syst. Nat. ed. 10, p. 778 [1]; Lamarck, Hist. Nat. des Anim. sans Vert. éd. 1, vi. 2, p. 188 [2]; éd. 2, par Deshayes, viii. p. 577 [3]; Sowerby, Conch. Illustr. no. 22, fig. 24 [4]; Thes. Conch. ii. p. 532, t. 116. figg. 229, 230 [5]; Reeve, Conch. Icon. ix. fig. 153 [6]; v. Mart. in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, *Neritina*, p. 246, t. 4. figg. 14–19 [7]; Fisch. & Crosse, Miss. Scient. Mex., Moll. ii. p. 490 [8].

Smaragdia viridis, Issel, Ann. Mus. Civ. Stor. Nat. Genova, xi. p. 429 (1878) [9]; Troschel, Gebiss der Schnecken, ii. p. 183, t. 16. fig. 21 [10].

Hab. E. Mexico: Vera Cruz (*Baker*).

Yucatan: Progreso (*Baker*).

E. Costa Rica (*Pittier* [8]).

Not rare in the Mediterranean and in the Caribbean Sea, also at the Bermudas (*Jones*, 1859); truly marine, on sea-grass.

POLYMESODA.

See *anteà*, p. 540.

16. Polymesoda maritima.

Cyrena maritima, C. B. Adams, Ann. Lyc. Nat. Hist. N. York, v. p. 499 (1852) [1]; Prime, Monogr. Am. Corbiculadæ, p. 27, fig. 20 [2] [nec *C. maritima*, d'Orbigny (1846) in Sagra's Hist. fis. polit. y nat. de Cuba, Mol. t. 26. figg. 47–49, = *cubensis*, Prime (1865), which is much nearer *P. salmacida*].

Hab. S. Panama: two and a half miles east of Panama, in impalpable mud, under bushes at high-water mark where a small stream emptied; some of the dead shells have *Balani* growing upon them (*C. B. Adams* [1 2]).

"Like all the species of this genus which live in estuaries, it is almost entirely deprived of epidermis, some few remnants of it only existing on the margins of the shell" (*Prime* [2], p. 28). The same is the case with the estuarine forms of *Neritina*. In the description, however, Prime [2] merely says: "epidermis greenish-brown, worn on the upper portion of the shell." C. B. Adams [1] describes it as having "an olivaceous coarsely striate epidermis." The general form of the shell is more like that of a true *Polymesoda* than of a *Cyrenocapsa*; but in the narrowness of the hinge-plate it agrees with the latter.

17. Polymesoda salmacida *.

Cyrena salmacida, Morelet, Test. Noviss. ii. p. 26 (1851) [1]; Deshayes, Catal. Conch. Brit. Mus. ii. p. 259 [2]; Prime, Ann. Lyc. Nat. Hist. N. York, vii. p. 315, t. 1. figg. 1, 1 *a*, *b* (1862) [3]; Monogr. Am. Corbiculadæ, p. 29, fig. 22 [4]; Sowerby, in Reeve's Conch. Icon. xx. t. 17. fig. 106 [5]; Fisch. & Crosse, Miss. Scient. Mex., Moll. ii. p. 642, t. 61. figg. 6, 6 *a*, 7 [6].

Ovate, more or less beaked behind, pale reddish with concentric darker bands, without distinct periostracum.

a. Long. 27, alt. 19, diam. ? millim. Vertices in ? long.
b. „ 25, „ 19, „ 13 „ „ „ $\frac{2}{5}$ „
c. „ 27, „ 18, „ 12 „ „ „ $\frac{1}{3}$ „

a. Morelet's measurements; *b*. Fischer and Crosse's fig. 6; *c*. Fischer and Crosse's fig. 7.

Hab. YUCATAN: Sisal, in marshes near the sea (paludibus maritimis) (*Morelet* [1 4 5 6]).

As Morelet found dead shells only ("testas inanes") it is not quite certain that the living shell is entirely without periostracum, or that it lives in brackish water; the other species of this subdivision of *Polymesoda*, however, live in places reached by the tide. Fischer and Crosse [6] treat the more distinctly beaked form (their figure 7) as a variety, *subrostrata*, but it seems to me to be nothing more than an individual variation; moreover, Morelet's description ("subrostrata") and measurements agree better with their fig. 7 than with fig. 6.

Besides the shells belonging to genera either strictly submarine or common to fresh and brackish water, there live at the mouths of the rivers or in the mangrove-swamps of Central America several species of truly marine genera. Though they do not actually come within the scope of this work, it is advisable to briefly notice such as have been recorded from the coasts of the region under investigation.

GASTROPODA RHACHIGLOSSA.

Rapana kiosquiformis.

Purpura kiosquiformis, Duclos, Ann. Sci. Nat. (1) xxvi. p. 107, t. 1. fig. 5 (1832) [1]; Kiener, Iconographie, *Purpura*, p. 59, t. 15. fig. 40 [2]; Deshayes, in Lamarck's Hist. Nat. des Anim. sans Vert. ed. 2, x. p. 96 [3]; Eydoux et Souleyet, Voyage de la Bonite, Zool. ii. p. 603, t. 59. figg. 23–25 (with living animal and operculum) [4] (copied in M. A. Gray's Fig. Moll. Anim. ii. t. 87 *a*. fig. 6, and in H. & A. Adams, Gen. Recent Moll. t. 14. fig. 3); Reeve, Conch. Icon. iii. t. 7. fig. 31 [5]; C. B. Adams, Ann. Lyc. Nat. Hist. N. York, v. p. 301 (1854) [6].

Cuma kiosquiformis, H. & A. Adams, Gen. Recent Moll. i. pp. 133, 134 [7]; Troschel, Gebiss d. Schnecken, ii. p. 137, t. 13. fig. 11 (radula) [8].

Purpura scalariformis (Lam.), d'Orbigny, Voy. Am. mér., Moll. p. 437 [9].

Shell somewhat biconic, with a strong, sharply knobbed, tuberculated middle keel and some more feeble spiral ridges below it; suture deep, in the last whorls peculiarly festooned; aperture oblong-oval, outer margin rather curved, crenulated; columellar margin dilated, appressed; channel short, bent backwards, forming a strong spiral ridge round the undermost part of the shell. Mud-coloured, aperture white or pale yellow.

Long. 42–61, diam. 27–38; apert. 26–35 millim.

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* "Salmacida aqua," in Pliny, "water a little salted."

Hab. Lower California: La Paz (*coll. Dunker*).

N.W. Mexico: Mazatlan (*coll. Dunker*).

S.W. Costa Rica: Punta Arenas, in the Gulf of Nicoya (*Hoffmann, in Mus. Berol.*).

S. Panama: Panama, abundantly from half-tide nearly up to the high-water mark of neap tides, on rocks, and on the lower parts of the trunks and about the roots of trees which were growing from a stony bottom (*C. B. Adams* [6]); Bay of Panama, on rocky places at low water (*Cuming* [5]).

Colombia: Tumaco (*Hopke, in Mus. Berol.*).

Ecuador: in the mouth of the river of Guayaquil (*Fontaine* [7]).

This species is probably peculiar to the mangrove-swamps of the West Coast.

Nassa luteostoma.

Buccinum luteostomum, Broderip & Sowerby, Zool. Journ. iv. p. 376 (1828–29) [1]; Kiener, Iconogr. *Buccinum*, p. 110, t. 30. fig. 1 [2]; Eydoux et Souleyet, Voyage de la Bonite, Zool. ii. p. 608, t. 41. figg. 6, 7 (living animal and operculum) [3] (copied in M. A. Gray's Fig. Moll. Anim. ii. t. 85 *a*. fig. 5).

Nassa luteostoma, Troschel, Archiv f. Naturg. 1852, p. 172, t. 6. fig. 5 (operculum) [4]; Carpenter, Catal. Mazatlan Shells, p. 404 [5]; Report Moll. W. N. Am. p. 268 [6]; Reeve, Conch. Icon. viii., *Nassa*, t. 10. fig. 63 [7]; Mörch, Malak. Blatt. vii. p. 90 (1860–61) [8].

*Nassa xanthostoma**, J. E. Gray, in Zool. of Capt. Beechey's Voyage, p. 27, t. 36. fig. 3 (1839) [9]; M. A. Gray, Fig. Moll. Anim. iv. pp. 17, 71 [10].

Shell suboval, pointed above, with strong, knobbed, nodulose ribs, about 10 in the last whorls, and numerous spiral ridges, grey or mud-brown; aperture comparatively small, outer and columellar margins thick, yellow, the former denticulated within, both united above by a thin callus which reaches halfway to the next upper suture; channel bent backward, open.

Long. $10\frac{1}{2}$–$14\frac{1}{2}$, diam. 7–10; apert. $6\frac{1}{2}$–8 millim.

Hab. California: San Diego (*Jewett*); La Paz (*Forrer, in Mus. Berol.*).

N.W. Mexico: Mazatlan, extremely abundant (*Reigen*).

S.W. Mexico: Acapulco (*Lesson* [2 6]).

W. Guatemala: Champerico, in company with *Potamides validus* (*Champion*); Esteros de Champerico (*Stoll*).

N. Nicaragua: Realejos (*Lesson* [2 6]).

S.W. Costa Rica: Punta Arenas, in the Gulf of Nicoya on sandy ground near the beach (*Œrsted* [8], *Hoffmann, in Mus. Berol.*); Costa Rica, without nearer indication of locality (*v. Seebach*).

S. Panama: Panama, on sand, usually not far below high-water mark, in places where water is running when the tide is low (*C. B. Adams*).

Also on the coast of Peru (*Tschudi*). Some authors [2 7] give Senegal as locality, but it has not been found on any part of the West Coast of Africa by any recent collector.

* "*Xanthostoma*" is only a philological correction for *luteostoma*, this latter being compounded of a Latin (*luteus*, yellow) and a Greek word.

BIVALVIA.

See *anteà*, p. 476.

Ostrea sp.

It is not improbable that Oysters are to be found in the mangrove-swamps both of the East and West Coasts of Central America, but I have hitherto failed to find any definite record concerning them. The West-Indian mangrove-oyster, known to me from Venezuela and Surinam, Jamaica, and Haiti, is *O. arborea*, Chemnitz, Syst. Conch.-Cab. viii. p. 46, t. 74. fig. 681 (copied in the French Encycl. Méth. t. 185. fig. 1), v. Mart. in M. Weber's Zool. Ergebn. Reise Niederl. Ostindien, iv. p. 220 [=*O. parasitica* (Gmelin, part.), Hanley, 'Recent Bivalve Shells,' p. 298; and *O. rhizophoræ*, Guilding, Zool. Journ. iii. p. 542 (1828)]; it differs from the East-Indian *O. mytiloides*, Lam., in the absence of the small knobs and pits at the edges of the shell near the hinge. The sharp-plaited *O. frons*, L. (*Mytilus*), Chemnitz, loc. cit. viii. p. 61, t. 75. fig. 686; Hanley, Conch. Miscell. t. 2. fig. 5; Reeve, Conch. Icon. xviii. t. 19. fig. 41, is the West-Indian analogue of the East-Indian *O. folium*, L.

On the West Coast *O. columbiensis*, Hanley, P. Z. S. 1845, p. 107; Conch. Miscell. t. 1. fig. 1; Reeve, Conch. Icon. xviii. t. 7. fig. 10, may perhaps live in the mangrove-swamps: see Mörch, Malak. Blätt. vii. p. 211 (1860–61).

Arca (Anomalocardia) tuberculosa.

Arca tuberculosa, Sowerby, P. Z. S. 1833, p. 19[1]; Philippi, Abbild. neuer Conch. i. p. 41, t. 1. fig. 2[2]; Hanley, Recent Bivalve Shells, p. 161[3]; Reeve, Conch. Icon. ii. t. 3. fig. 18[4]; C. B. Adams, Ann. Lyc. Nat. Hist. N. York, v. p. 687 (1852)[5]; Mörch, Malak. Blätt. vii. p. 205 (1860–61)[6]; Kobelt, in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, *Arca*, p. 21, t. 6. fig. 34[7].

Oval, swollen, equivalve, subauriculate, dark reddish-brown, with 36–37 radiating ribs, which are beset with scattered little tubercles, especially in the posterior part of the shell; ligamental area narrow.

Long. 57–70, alt. 42–48, diam. 42 millim.; summits in $\frac{1}{3}$ of the length.

Hab. W. Nicaragua: Realejos, at low water, at the roots of the mangrove-trees (*Cuming* [1–4], *Œrsted* [7]).

S. Panama: Panama, in impalpable mud, under a mangrove-thicket, near high-water mark (*C. B. Adams* [5]).

Venus (Cryptogramma) flexuosa, L.

Rather dwarf specimens of this species, the largest 11 millim. in length, 7 in height, and $4\frac{1}{2}$ in diameter, summits in $\frac{1}{3}$ of the length, posterior end much produced (as shown in Reeve's Conch. Icon. xiv. t. 21. fig. 98 *a*), have been found by Herr Höge at Progreso, Yucatan, with *Potamides costatus*. This species is widely distributed in the West Indies and along the coast of Brazil; d'Orbigny, Voy. Am. mér. p. 553, mentions it even from the mouth of the Rio Plata.

Potamomya?

C. B. Adams, Ann. Lyc. Nat. Hist. of N. York, v. pp. 549, 550 (1852), describes three new species of *Potamomya*, which he names *æqualis*, *inflata*, and *trigonella*, found all three together 2½ miles east of Panama, without giving any particulars concerning the sort of ground and the depth in which they live. Carpenter, Moll. West N. Am. p. 204 (1872), who has seen Adams's specimens, believes that all three are probably individual variations of one species. The genus *Potamomya* (*Azara*, d'Orb.) is chiefly known from the southernmost part of America, from brackish water, but no other collector has found a species of it in the tropical part of the West Coast, so it is not unlikely that Adams's shells are simply a marine form of *Corbula*.

SUPPLEMENT.

This Supplement includes such additions to the fauna and corrections in the synonymy that have been noticed since the publication of the preceding pages, commenced in May 1890. Fischer and Crosse (Mission Scientifique au Mexique) have dealt with the Helicinidæ and a portion of the Cyclostomidæ subsequent to my enumeration of the species of these families (*anteà*, pp. 12–45), and I therefore quote their work in full.

Messrs. H. Pittier and P. Biolley have recently sent me various interesting forms from Costa Rica, some of which I have already dealt with in the preceding pages; the remainder will be noticed here. In giving the additional localities, the names of the main geographical regions previously mentioned in this work are included within square brackets.

CYCLOTUS (p. 3).

Cyclotus (Aperostoma) irregularis (p. 3).

Cyclotus irregularis, Biolley, Mol. terr. y fluv. de Costa Rica, p. 3 (1897) [5].

To the localities given, add:—

Hab. E. Costa Rica: San Miguel, El Reventazon, Santa Clara, and Carillo, 200–500 metres above the sea (*Biolley* [5]); Valley of Tuis, 600 metres (*Pittier*: a banded specimen).

S.W. Costa Rica: San Mateo, 250 metres (*Biolley* [5]); Ravine of Vijaqual in the valley of the Rio Saveque; El Pital, in the valley of the Rio Naranjo; Alto de Mano Tigre, in the valley of the Rio Grande de Terraba; and Quebrada de Tocori, in the valley of the Rio Paqueta, 150–700 metres (*Pittier*).

Biolley [5] states that the species does not occur on the elevated plateau of Central Costa Rica.

Var. *pittieri*, n.

Distinctly flatter than the typical form, less vaulted, 29 millim. only in diameter, 16½ in height; aperture 12 millim.

Hab. N.W. Costa Rica: Bay of Salinas (*Pittier*, July 1890).

Cyclotus (Aperostoma) bisinuatus (p. 3).

To the localities given, add:—

S.W. Costa Rica: Terraba (*Pittier*).

Cyclotus (Aperostoma) dysoni (p. 3).

Aperostoma dysoni, Ancey, Ann. de Malac. ii. p. 250 (1886) [14].

Cyclotus dysoni, Pilsbry, Proc. Acad. Phil. 1891, p. 325 [15], and 1892, p. 338 [16]; Biolley, Mol. terr. y fluv. de Costa Rica, p. 4 [17].

To the localities given, add:—

Hab. [S.E. Mexico:] Mountains of Poana, Tabasco (*Rovirosa* [16]).

[Yucatan:] Silam, Shkolak, Tekanto, Labna, Tunkas, Ticul, Stilpech, and Tapi; "one of the most abundant land-shells of northern Yucatan" (*Heilprin* [15]).

E. Guatemala (*H. v. Ihering*).

[Honduras:] Copan (*H. v. Ihering*); Eastern Coast (*Simpson* [14]).

[Central Nicaragua:] Managua (*Rothschuh*).

E. Costa Rica: Turrialba, 750 metres (*Biolley* [17]); Valley of Tuis (*Pittier*).

[N.W. Costa Rica:] Bay of Salinas (*Pittier*).

S.W. Costa Rica: Surubres, near San Mateo, 250 metres (*Biolley* [17]); Terraba, 200–300 metres (*Pittier*); Alto de Mano Tigre, 690–700 metres (*Pittier*).

Var. *multilineatus*.

Cyclotus dysoni, var. *multilineatus*, Pilsbry, Proc. Acad. Phil. 1891, p. 325 [1].

Varied by numerous dark spiral lines and bands.

Hab. Yucatan: Tabi and Ticul (*Heilprin* [1]).

Cyclotus (?) boucardi (p. 5).

To the localities given, add:—

Hab. [E. Costa Rica:] Moin near Limon, along the coast at the foot of the cliffs (falaises), in thickets of Bromeliaceous plants (*Pittier*, July 1898).

CYCLOPHORUS (p. 5).

Cyclophorus (Amphicyclotus) ponderosus (p. 6).

To the localities given, add:—

[N. Guatemala:] San Juan in Vera Paz (*Champion*: a specimen 42 millim. in diameter).

There is a still larger one, 52 millim. in diameter, among those found at Coban by Salvin; hence the measurements given in the comparative table (*anteà*, p. 2) require modification.

Cyclophorus (Amphicyclotus) maleri (p. 6).

Cyclophorus maleri, Pilsbry, Proc. Acad. Phil. 1892, p. 338 [3].

To the localities given, add:—

Hab. S.E. Mexico: Mountains of Poana, Tabasco (*Rovirosa* [3]).

The general habitat was incorrectly given on p. 6 as S.W. Mexico.

Cyclophorus (Amphicyclotus) texturatus (p. 6).

Var. *goldfussi*.

Amphicyclotus goldfussi, Böttger, Nachrichtsblatt d. deutsch. malak. Ges. 1892, p. 203 [8].

Very similar to the normal form, but with 6 whorls, and the measurements somewhat different: Diam. maj. 51, alt. 28, apert. 21 millim. (in the largest specimens of *C. texturatus* from N. Guatemala: 45, 20½, 19).

Hab. Honduras: San Pedro Sula, in the north-western portion of Honduras [8].

5 (a). Cyclophorus (Amphicyclotus) underwoodi.

Cyclophorus underwoodi, S. F. da Costa, Proc. Mal. Soc. London, iv. p. 67, t. 7. figg. 5–8 (1900) [1].

Depressed, spirally ridged, chestnut-brown above, pale greenish below, with a chestnut-brown band below the periphery; suture somewhat channelled; aperture very oblique, peristome straight, notched in the middle of the parietal callosity.

Diam. maj. 45, min. 32, alt. 30 millim.

Hab. N.W. Costa Rica: Carillo (*Underwood* [1]).

Near *C. cumingi*, Sow., from Colombia.

Cyclophorus (?) giganteus (p. 8).

Cyclotus giganteus, anteà, p. 8.

This species is mentioned by Boucard among the shells from Vera Paz (N. Guatemala) exhibited in the Universal Exposition at Paris, 1878 (Bull. Soc. Zool. Fr. iii. p. 170), probably an error in determination, as *C. giganteus* has not been recorded by anyone else from so far north as Guatemala.

CHOANOPOMA (p. 13).

Choanopoma trochleare (p. 13).

Fischer and Crosse (Miss. Scient. Mex., Moll. ii. p. 182) treat their *C. chiapasense* as distinct from *C. trochleare*, and mention the latter (*loc. cit.* p. 214) as a doubtful species of the genus *Cistula*, according to Pfeiffer [3]. They state that *C. trochleare*, Reeve,

probably belongs to a different species, and that its locality "Chiapas" is doubtful. Indeed, the figure of it given by Reeve [5] represents a shell of larger size and with flatter whorls than the one shown by Pfeiffer [2], which must be regarded as typical.

Choanopoma sumichrasti (p. 13).

Choanopoma sumichrasti, Fischer & Crosse, Miss. Scient. Mex., Moll. ii. p. 184, t. 41. figg. 9, 9 *a* [3].

In this species the spiral bands are continuous, not interrupted, a character rarely seen in this genus.

Choanopoma osberti (p. 16).

Adamsiella osberti, Fischer & Crosse, Miss. Scient. Mex., Moll. ii. p. 178 [3].

Chondropoma andrewsæ (p. 16).

Colobostylus andrewsæ, Crosse & Fischer, Journ. de Conch. xxxvi. p. 233 (1888) [2]; Simpson, Nautilus, xi. p. 13 (1897) [3].

To the locality given, add:

[Honduras:] Island of Utila, in a grove of the prickly thatch-palm (*Thrinax radiatus*), on the ground (*Simpson* [3]).

This species does not really belong to *Chondropoma*, as it agrees in the structure of the testaceous operculum (previously unknown to me) with the West-Indian forms, which were left by Dr. Pfeiffer in his genus *Cyclostomus*. These latter were separated into a distinct group [Malak. Blätt. xi. p. 134 (1864)], which was subsequently named *Colobostylus* by Crosse and Fischer [2].

Chondropoma subangulatum (p. 17).

Cistula subangulata, Fischer & Crosse, Miss. Scient. Mex., Moll. ii. p. 200 [2].

Chondropoma rubicundum (p. 17).

Chondropoma rubicundum, Fischer & Crosse, Miss. Scient. Mex., Moll. ii. p. 205 [8]; Pilsbry, Proc. Acad. Phil. 1892, p. 338 [9].

To the localities given, add:—

Hab. S.E. Mexico: Mountains of Poana, Tabasco (*Rovirosa* [9]).

[N. Guatemala:] Cahabon (*Sarg* [8]).

Fischer and Crosse [8] distinguish several varieties in size and in the more or less bright colour of the aperture; their largest specimen is 14 millim. in length and 8 in diameter, their most inflated one 12 millim. in length and $8\frac{1}{2}$ in diameter.

Chondropoma cordovanum (p. 17).

Chondropoma cordovanum, Fischer & Crosse, Miss. Scient. Mex., Moll. ii. p. 207 [5].

These authors give the length of a truncate specimen as $9\frac{1}{2}$ millim., with a diameter

of 6, and the aperture, including the peristome, $4\frac{1}{2}$ millim.; Pfeiffer himself [3] gives 13–15 in length, 6–$7\frac{1}{2}$ in diameter.

Var. *procerum*.

Chondropoma cordovanum, var. *β. procera*, Fischer & Crosse, loc. cit. p. 208, t. 41. figg. 6 *c–e* [6].

With conspicuous interrupted bands and a pale unicolorous peristome.
Long. 12, diam. $6\frac{1}{2}$; apert. $4\frac{1}{2}$ millim.

Hab. E. Mexico: Cordova, with the typical form (*Sallé* [6]).

Var. *igneum*.

Chondropoma cordovanum, var. *ignea*, Fischer & Crosse, loc. cit. pp. 208, 209, t. 41. figg. 6 *f–h* [7].
Cyclostoma cordovanm, Boucard, Bull. Soc. Zool. Fr. iii. p. 170 [8].

With obsolete bands and bright orange peristome.
Long. 10, diam. 6; apert. 4 millim.

Hab. Guatemala: Cahabon (*Sarg* [7]).

Chondropoma acerbulum (p. 17).

Chondropoma acerbulum, Fischer & Crosse, Miss. Scient. Mex., Moll. ii. p. 210, t. 41. figg. 4, 4 *a–d* [4].

Chondropoma radiosum (p. 18).

Cistula radiosa, Fischer & Crosse, Miss. Scient. Mex., Moll. ii. p. 188, t. 42. figg. 1, 1 *a*, *b*, 2, 2 *a*, 3, 3 *a–d* [4].

These authors distinguish two varieties, chiefly according to the size, the largest measuring 20 millim. in length and 9 millim. in diameter, both found with the typical form by A. Morelet in Peten.

Chondropoma sargi (p. 18).

Cistula sargi, Fischer & Crosse, Miss. Scient. Mex., Moll. ii. p. 191, t. 42. figg. 4, 4 *a–i*, 5, 5 *a*, and 6 [2].

To the localities given, add :—
[N. Guatemala:] San Miguel de Tucuru, Alta Vera Paz (*Sarg* [2]).

Of this species, also, Fischer and Crosse distinguish two varities of minor importance, found with the typical form, which differs from the nearly allied *C. radiosum* in the finer sculpture (see their fig. 4 *c* as compared with 1 *b*). They also figure the young shell (figg. 4 *d–f*).

9 (A). Chondropoma martensianum.

Chondropoma martensianum, Pilsbry, Nautilus, xiii. p. 140 (April 1900) [1].

Hab. S.E. Mexico: Mountains of Poana, Tabasco (*Rovirosa* [1]).

Chondropoma küsteri (p. 18).

Cistula küsteri, Fischer & Crosse, Miss. Scient. Mex., Moll. ii. p. 194, t. 42. figg. 7, 7 *a*, *b* [5].

To the locality given, add:—

N. GUATEMALA: San Miguel de Tucuru, Alta Vera Paz (*Sarg* [5]); Poctun, Vera Paz, (*Sallé* [5]); Guatemala, without nearer indication of locality (*Morelet* [5]).

Chondropoma largillierti (p. 19).

Cistula largillierti, Fischer & Crosse, Miss. Scient. Mex., Moll. ii. p. 196, t. 42. figg. 10, 10 *a*, *b* [6].
Chondropoma (*Cistula*) *largillierti*, Pilsbry, Proc. Acad. Phil. 1891, p. 331 [7a].

To the localities given, add:—

[YUCATAN:] Carmen and Merida (*Morelet* [6]); Labna, Santa Ana near Calcehtok, Silam, Merida, Tekanto, Tunkas, Uxmal, Sitilpech, and Tabi (*Heilprin* [15]).

In the young, non-truncated shell of four whorls the first whorl is smooth and globose and the umbilicus is rather broad.

Var. *grateloupi*.

Cistula grateloupi, Fischer & Crosse, loc. cit. p. 198, t. 42. figg. 8, 8 *a*, *b*, and 9 [13].

Fischer and Crosse treat *C. grateloupi* and *C. largillierti* as specifically distinct, urging that in the former the sculpture is rather latticed by the comparatively stronger spiral ridges and that the sutural denticles are united into groups ("fasciculatim dilatatis"). Pilsbry [7a], on the contrary, who had, like myself, a large number of specimens before him, agrees with me "that a separation of the more coarsely ribbed forms from the finely decussated examples is not practicable"; he states also that the colour varies from a clear yellowish-white, with numerous rows of brown spots, to dark red, and that also the shape of the shell is subject to great variation.

Chondropoma vespertinum (p. 19).

Chondropoma vespertinum, Fischer & Crosse, Miss. Scient. Mex., Moll. ii. p. 211, t. 41. figg. 7, 7 *a* [4].

DIPLOMMATINA (p. 20).

Ancey [Journ. de Conch. xlvii. pp. 194–197 (1899)] states that four species of American Diplommatinæ are now known: viz. our *D. stolli*; *D. occidentalis*, Guppy, from the Island of Trinidad; *D. limensis*, from Peru; and *D. tucma*, Döring, from Argentina. The two latter are placed by A. Döring [Apuntes Faun. Molusc. Argentin. pt. 5 (1884)] in his new genus *Adelopoma*; he remarks that it is not very probable that all these have been accidentally introduced from India or Polynesia to the American continent.

HELICINA (p. 28).

My subdivision I., *Carinatæ*, of this genus (*anteà*, p. 28) is named *Oxyrhombus* by Fischer and Crosse [Miss. Scient. Mex., Moll. p. 399 (1893)]; II., *Rostratæ* (*anteà*, p. 30), *Caloplisma* (*cf.* Fisch. & Crosse, *loc. cit.* p. 405); and V., *Elate trochiformes*, *Pyrgodomus* (*cf.* Fisch. & Crosse, *loc. cit.* p. 440). It may be noted here that the anatomical characters of the family Helicinidæ are also given by these authors (*loc. cit.* pp. 390–393).

Helicina ghiesbreghti (p. 28).

Helicina ghiesbreghti, Fischer & Crosse, Miss. Scient. Mex., Moll. ii. p. 399, t. 55. figg. 5, 5 *a–c* [5]; Pilsbry, Proc. Acad. Phil. 1892, p. 339 [6].

To the localities given, add:—

Hab. [S.E. Mexico:] Mountains of Poana, Tabasco (*Rovirosa* [6]).

Fischer and Crosse [5], evidently by mistake, quote the localities "Honduras," "Nicaragua," and "Bugaba, Panama," given by myself for *H. amœna* and its varieties, under this species.

Helicina amœna (p. 28).

Helicina amœna, Fischer & Crosse, Miss. Scient. Mex., Moll. ii. p. 401, t. 55. figg. 3, 3 *a–c*, and 4 [10]; Ancey, Ann. de Malac. ii. p. 259 (1886) [11].

To the localities given, add:—

Hab. [Honduras:] Island of Utila (*Simpson* [11]).

Helicina sowerbyana (p. 28).

Helicina sowerbyana, Fisch. & Crosse, Miss. Scient. Mex., Moll. ii. p. 444 [7].

These authors doubt the validity of this species, as well as its supposed locality, Guatemala.

Helicina cinctella (p. 29).

Helicina cinctella, Fischer & Crosse, Miss. Scient. Mex., Moll. ii. p. 403, t. 55. figg. 6, 6 *a–c*, and 7, 7 *a–c* [8]; Pilsbry, Proc. Acad. Phil. 1891, p. 332 [9].

To the localities given, add:—

Hab. [E. Mexico:] Orizaba [8] (*Heilprin*, 1890 [9]).

Fischer and Crosse distinguish two forms of this species—*cinctella*, var. β, Pfr. (Monogr. Pneum. Vivent. ii. p. 216), and var. *botteriana*, Pfr. (their fig. 7); but as the differences are very slight and gradual, and the localities are the same, they can scarcely be regarded as anything more than individual variations.

Helicina rostrata (p. 30).

Helicina rostrata, Fischer & Crosse, Miss. Scient. Mex., Moll. ii. p. 465, t. 55. figg. 8, 8 *a–c*, and 9, 9 *a–c* [12].

To the localities given, add:—

Hab. [CENTRAL NICARAGUA:] Managua (*Rothschuh, in Mus. Berol.*).

Fischer and Crosse [12] distinguish the specimens without bands as var. *simplex* (their figg. 9); they mention no particular locality for it.

Helicina zephyrina (p. 30).

Helicina zephyrina, Fischer & Crosse, Miss. Scient. Mex., Moll. ii. p. 407, t. 5. figg. 10, 10 *a–c*, and 11 (living animal) [22].

To the localities given, add:—

Hab. [E. MEXICO:] Tustepec, in the State of Oaxaca, Alvarado, Cosamalaopam, and Vera Cruz (*Sallé* [22]).

The largest specimen I have seen measures 17 millim. in diameter and 14½ in height, the smallest full-grown one 12 millim. in diameter and 10 in height; the first-mentioned example was obtained by H. H. Smith at Atoyac, the small one at Cordova by Höge. Fischer and Crosse [22] state that the type specimens described by Duclos [7] were collected at Vera Cruz by A. Sallé.

Helicina cordilleræ (p. 32).

Helicina cordilleræ, Fischer & Crosse, Miss. Scient. Mex., Moll. ii. p. 412, t. 57. figg. 1, 1 *a–c*, and 2, 2 *a* [5].

These authors state [5] that the exact locality for this species is the Rancheria del Jacale, on the slope of the Pico de Orizaba, the highest inhabited place on the volcano of that name, and near the limits of the snow, at an elevation of 3500 metres above the sea, where it has been found by A. Sallé. Most specimens have a single well-defined dark red spiral band, placed at the periphery of the shell, and several indistinct ones, but in some examples (their fig. 2) the peripheral band also is scarcely visible.

One of Reeve's figures, t. 17. fig. 151 (not 149, as quoted on p. 32), must be omitted from the synonymy of this species.

Helicina funcki (p. 33).

Helicina funcki, Biolley, Mol. terr. y fluv. de Costa Rica, p. 4 (1897) [9]; Ancey, Nautilus, xi. p. 87 (1897) [10].

To the localities given, add:—

E. NICARAGUA: Greytown (*Ancey* [10]).

N.E. Costa Rica: San Miguel, valley of the Sarapiqui, 200 metres; Puerto Viejo (*Biolley* [9]); on the borders of the Rio San Juan (*Pittier*).

[E. Costa Rica:] Tuis, 600 metres (*Biolley* [9], *Pittier*); Turrialba, 750 metres (*Biolley*).

Central Costa Rica: Azahar de Cartago and Tarbaca, 1500–1600 metres, only the smaller varieties (*Biolley*).

S.W. Costa Rica: Bay of Terraba, Tocori in the valley of the Rio Paquita, middle part of the Rio Saveque and lower part of the Rio Pacuare (*Pittier*); El Pital, in the valley of the Rio Naranjo, some specimens banded and others more elevated (*Pittier*).

N. Panama: Monkey Hill, near Colon (*Aillaud* [10]).

Biolley says that this is the commonest species of the genus in Costa Rica, found on the trunks of trees, the stems of plantains (*Musa*), and also on the ground.

Helicina chrysocheila (p. 33).

Helicina chrysochila, Fischer & Crosse, Miss. Scient. Mex., Moll. ii. p. 414 [8].

Var. *shuttleworthi.*

Helicina shuttleworthi, Fischer & Crosse, loc. cit. p. 415 [9].

No additional localities are mentioned for this species.

Helicina tenuis (p. 34).

Helicina lindeni, Ancey, Ann. de Malac. ii. p. 258 (1886) [24]; Fischer & Crosse, Miss. Scient. Mex., Moll. ii. p. 416, t. 56. figg. 1, 1 *a*, *b*, 2, 2 *a*, *b*, 3, 3 *a*, *b* [25].

Helicina tenuis, var. *chiapensis,* Pilsbry, Proc. Acad. Phil. 1892, p. 339 [26].

Helicina tenuis, Biolley, Mol. terr. y fluv. de Costa Rica, p. 5 [27].

To the localities given, add:—

Hab. [S.E. Mexico:] Poana, Tabasco (*Rovirosa* [26]).

Honduras: East Coast, specimens of smaller size, 9 millim. in diameter, $7\frac{1}{4}$ high (*Simpson* [24]).

N.E. Costa Rica: La Paz, on the road to the Rio Sarapiqui (*Biolley* [27]).

Central Costa Rica: Alajuela, 900–1000 metres (*Orosco*).

S.W. Costa Rica: Turubares, 200 metres (*Biolley* [27]); along the Rio de los Platanales and the Golfo Dulce (*Pittier*).

Of the two specific names given to this species by Dr. Pfeiffer [2 16] in the same part of the 'Proceedings of the Zoological Society' for 1848, Fischer and Crosse prefer *lindeni*, because it appears one page earlier; I have used *tenuis*, as the most applicable. Pfeiffer himself separated them in his last publication [Monogr. Pneum. Vivent. iv. pp. 268, 276 (1876)] by seventy-eight species, referring the one to the group without keel and the other to the "Subcarinatæ."

Helicina fragilis (p. 35).

Helicina fragilis, Pilsbry, Proc. Acad. Phil. 1894, p. 332 [12]; Fischer & Crosse, Miss. Scient. Mex., Moll. ii. p. 420, t. 57. figg. 7, 7 *a, b* (var. *merdigera*), 8, 8 *a, b* (var. *elata*), and 9, 9 *a, b* (normal form) [13].

To the localities given, add :—

Hab. [E. Mexico :] Orizaba (*Heilprin* [12]).

A. Sallé [13] has observed that this species covers itself with its own excrement, probably for protection. The European *Buliminus* (*Merdigerus*) *obscurus* and some species of *Pupa* have a similar habit.

Helicina succincta (p. 36).

Helicina succincta, Fischer & Crosse, Miss. Scient. Mex., Moll. ii. p. 422 [1].

Helicina raresulcata (p. 36).

Helicina raresulcata, Fischer & Crosse, Miss. Scient. Mex., Moll. ii. p. 423 [5].

Helicina arenicola (p. 36).

Helicina arenicola, Pilsbry, Proc. Acad. Phil. 1891, p. 332 [7]; Fischer & Crosse, Miss. Scient. Mex., Moll. ii. p. 424, t. 56. figg. 8, 8 *a–c* [8].

To the locality given, add :—

Hab. [N. Yucatan :] Silam, Ticul, Labna, Tabi, Uxmal, Tunkas, Santa Ana near Calcehtok, and between Sitilpech and Tunkas, most abundant, as variable in coloration as *H. orbiculata*, Say (*Heilprin* [7]).

Helicina punctisulcata (p. 36).

Helicina punctisulcata, Fischer & Crosse, Miss. Scient. Mex., Moll. ii. p. 427 [1].

Helicina durangoana (p. 37).

Helicina durangoana, Fischer & Crosse, Miss. Scient. Mex., Moll. ii. p. 426, t. 56. figg. 7, 7 *a–c* [3].

These authors [1] think that this species belongs to the group of *H. zephyrina*.

Helicina delicatula (p. 37).

Helicina delicatula, Fischer & Crosse, Miss. Scient. Mex., Moll. ii. p. 427, t. 57. figg. 3, 3 *a–c* (var. *unicolor*), and 4, 4 *a* [8].

Helicina oweniana (p. 38).

Helicina oweniana, Pilsbry, Proc. Acad. Phil. 1892, p. 339 [14]; Fischer & Crosse, Miss. Scient. Mex., Moll. ii. p. 429, t. 56. figg. 4, 4 *b, c* (normal form), 4 *a* and 5, 5 *a* (var. *coccinostoma*), t. 57. figg. 5, 5 *a–c* (var. *anozona*) [15]; Biolley, Mol. terr. y fluv. de Costa Rica, p. 5 (var. *anozona*) [16].

To the localities given, add :—

Hab. [S.E. MEXICO :] Poana, Tabasco, "a rather aberrant variety, but in all probability belonging to this species" (*Rovirosa* [14]).

E. COSTA RICA: Las Delicias, near Santa Clara, 400 metres (*Biolley* [16]: vars. *coccinostoma* and *anozona*); Tuis, 600 metres (*Pittier*, *Biolley*: var. *anozona*).

Helicina notata (p. 38).

Helicina notata, Fischer & Crosse, Miss. Scient. Mex., Moll. ii. p. 431, t. 56. figg. 6, 6 *a–c* [5].

Helicina flavida (p. 38).

Helicina flavida, Fischer & Crosse, Miss. Scient. Mex., Moll. ii. p. 433, t. 57. figg. 10, 10 *a*, *b*, and 11, 11 *a* (typical specimens of *H. trossula*, Morelet) [22]; Pilsbry, Nautilus, x. p. 59 (1896) [23].

To the localities given, add :—

Hab. [E. MEXICO :] San Rafael, Jicaltepec (*Townsend* [23]).

HONDURAS: Copan (*v. Ihering*).

Var. *beatrix* (p. 39).

Helicina beatrix, Pilsbry, Proc. Acad. Phil. 1894, p. 332 [24].

To the locality given, add :—

Hab. [E. COSTA RICA :] Talamanca (*Pittier*); Valley of Tuis (*Pittier & Biolley*); Santa Clara, 200 metres (*Biolley*); Valley of Alta Coca, near Talamanca, 1000 metres (*Pittier*); between Uiskur and Mokri, Alta Talamanca, further in Alta Uren, and between Ukatschka and Bruschik, in Alta Taruria (*Pittier*).

A specimen from Santa Clara measures no less than 10 millim. in diameter and 9 in height. Fischer and Crosse [22], as well as Pilsbry [23], are inclined to treat this form as specifically distinct from *H. flavida*, which perhaps would be the best way of dealing with it.

Helicina chryseis (p. 39).

Helicina chryseis, Fischer & Crosse, Miss. Scient. Mex., Moll. ii. p. 440, t. 57. figg. 6, 6 *a*, *b* [3].

Helicina borealis (p. 40).

Helicina borealis, Fischer & Crosse, Miss. Scient. Mex., Moll. ii. p. 435 [1].

These authors suggest that this may be a variety of *H. durangoana*, Mouss., next which I have placed it in the table of the species (*anteà*, p. 26). They are certainly very similar in general aspect and in the form of the aperture; but *H. borealis* is of larger size and comparatively more depressed than the rather conical *H. durangoana*. Amongst more than a dozen specimens of *H. borealis* and two of *H. durangoana* before me, the latter received from Mr. Forrer, there is, however, no intermediate form.

Helicina dysoni (p. 40).

Helicina dysoni, Ancey, Ann. de Malac. ii. p. 255 (1886) [5]; Simpson, Nautilus, xi. p. 13 (1897) [6].

To the localities given, add:—

Hab. [HONDURAS:] Island of Utila, in a grove of the prickly thatch-palm (*Thrinax radiatus*), living ones on the underside of its leaves, dead shells on the ground (*Simpson* [5 6]).

Var. *bocourti* (p. 40).

Helicina dysoni, var. *bocourti*, Fischer & Crosse, Miss. Scient. Mex., Moll. ii. p. 437, t. 56. figg. 10, 10 *a*, *b* [9].

Helicina lirata (p. 41).

Helicina lirata, Pilsbry, Proc. Acad. Phil. 1891, p. 332 [22]; Nautilus, xiii. p. 139 [23]; Fisch. & Crosse, Miss. Scient. Mex., Moll. ii. p. 398 [24].

To the localities given, add:—

Hab. [S.E. MEXICO:] San Juan Bautista (*Höge*); garden of the Juarez Institute, in the same town (*Rovirosa* [23]).

[YUCATAN:] Labna (*Heilprin* [22]).

[N. GUATEMALA:] Panzos (*Conradt*).

S.W. COSTA RICA: Alto de Mano Tigre, 690 metres (*Pittier*).

Var. *rusticella* (p. 41).

To the localities given, add:—

Hab. S.W. COSTA RICA: El Pozo, in the shingle (gravices) of the Rio Grande de Terraba (*Pittier*).

Var. *unidentata* (p. 41).

Helicina lirata, var. *unidentata*, Ancey, Ann. de Malac. ii. p. 264 (1886) [19a].

To the locality given, add:—

Hab. [HONDURAS:] Utila Island (*Simpson* [19a]).

TROCHATELLA (to follow the genus *Helicina*, p. 42).

Trochatella, Swainson, Treatise of Malacology, p. 337 (1840); Pfeiffer, Monogr. Pneum. Vivent. i. p. 328.

This genus is nearly allied to *Helicina*, from which it may be known by the absence of the callosity covering the middle part of the lower face of the shell. It has hitherto been limited to the West Indies, and its occurrence in Utila affords another instance of the prevalence of Antillean types in this island: cf. *Cylindrella*, suprà, p. 286.

1. Trochatella simpsoni.

Trochatella simpsoni, Ancey, Ann. de Malac. ii. p. 253 (1886) [1].

Shell conical, of a straw-yellow colour, not shining.
Diam. $2\frac{1}{2}$, alt. $2\frac{1}{2}$, apert. $1\frac{1}{4}$ millim.

Hab. HONDURAS: Utila Island (*Simpson* [1]).

SCHASICHILA (p. 43).

Schasichila nicoleti (p. 43).

Schasichila nicoleti, Fischer & Crosse, Miss. Scient. Mex., Moll. ii. p. 451, t. 54. figg. 4, 4 *a–h* [6].

Schasichila pannucea (p. 43).

Schasichila pannucea, Fischer & Crosse, Miss. Scient. Mex., Moll. ii. p. 448, t. 54. figg. 5, 5 *a* [9].

Var. *misantlensis.*

Schasichila pannucea, var. *β. misantlensis,* Fischer & Crosse, loc. cit. p. 449, figg. 5 *b–d* [10].

Somewhat larger, pale yellowish, summits rose-coloured.
Diam. 12, alt. 9 millim.

Hab. E. Mexico: Misantla (*Strebel*).

Schasichila alata (p. 44).

Schasicheila alata, Pilsbry, Proc. Acad. Phil. 1891, p. 332 [11]; Fischer & Crosse, Miss. Scient. Mex., Moll. ii. p. 447, t. 54. figg. 6, 6 *a* [12].

To the localities given, add:—

Hab. [E. Mexico:] Misantla (*Strebel* [12]); Orizaba (*Heilprin* [11]).

4. **Schasichila fragilis.**

Schasicheila fragilis, Pilsbry, Proc. Acad. Phil. 1899, p. 391 [1].

"Differs from *S alata* and *pannucea* in the smaller size, more fragile texture, and the very much shallower notch at the upper termination of the outer lip."
Diam. 6, alt. 4½ millim.

Hab. N.E. Mexico: Diente near Monterey, State of Nuevo Leon (*Mr. & Mrs. Rhoads* [1]).

5. **Schasichila vanattai.**

Schasicheila vanattai, Pilsbry, Proc. Acad. Phil. 1899, p. 391 [1].

"Distinct by the strong peripheral keel."
Diam. 6–6·8, alt. 4·3–5·5 millim.

Hab. N.E. Mexico: Diente, with the preceding species (*Mr. & Mrs. Rhoads* [1])

6. **Schasichila hidalgoana.**

Schasicheila hidalgoana, Dall, Nautilus, xi. p. 62 (1897) [1].

Trochoid depressed, with a rather pointed spire; periphery obscurely keeled.
Diam. 12, alt. 8½, apert. 6 millim.

Hab. Central Mexico: Encarnacion, State of Hidalgo (*E. W. Nelson* [1]).

Doubtful Species.

Schasichila minuscula.

Helicina minuscula, Pfr. P. Z. S. 1859, p. 29 [1].

Schasicheila minuscula, Pfr. Monogr. Pneum. Vivent., Suppl. ii. p. 247 [2]; Paetel, Catal. Conch.

Samml. 1883, p. 192, and 1889, p. 502[3]; Fischer & Crosse, Miss. Scient. Mex., Moll. ii. p. 452, t. 54. figg. 7, 7 *a*, *b*[4].

Schasicheila minima ("Pfr."), Strebel, Beitr. Mex. Land- u. Süssw. Conch. iv. p. 98 (without description), t. 3. fig. 6 (1880)[5].

Conical-globose, almost smooth, yellowish.
Diam. 4½, alt. 3 millim.

Hab. Mexico[3].

Pfeiffer[1 2] did not know the habitat of this species: Paetel[3] gives "Mexico." The specimen described and figured by Fischer and Crosse[4] was obtained from the dealer Gust. Schneider, with the locality Misantla, as given by Strebel. Strebel himself[5] figures a *Schasichila*, without describing it, and without stating how much his figure was magnified. *S. fragilis*, Pilsbry, possibly belongs to the same species, but it is somewhat larger than Fischer and Crosse's specimen.

PROSERPINA (p. 44).

Proserpina (Ceres) eolina (p. 44).

Ceres eolina, Fischer & Crosse, Miss. Scient. Mex., Moll. ii. p. 382, t. 54. figg. 2, 2 *a–c*[3].

To the localities given, add:—

Hab. [E. Mexico:] Cerro de Palma *, Sierra de Matlaquihahuilt, near Toxpam (*Sallé*[8]).

Proserpina (Ceres) sallæana (p. 45).

Proserpina (*Ceres*) *salleana*, Pilsbry, Proc. Acad. Phil. 1891, p. 332[6].

Ceres salleana, Fischer & Crosse, Miss. Scient. Mex., Moll. ii. p. 383, t. 54. figg. 3, 3 *a–d*[7].

To the localities given, add:—

Hab. [E. Mexico:] Orizaba, both the red and the buff forms (*Heilprin*[6]); Cerro de Palma, on the ground, unaccompanied by *P. eolina* (*Sallé*[7]).

2 (a). **Proserpina (Ceres) nelsoni.**

Ceres nelsoni, Fischer & Crosse, Miss. Scient. Mex., Moll. ii. p. 668, t. 55. figg. 1, 2[1]; Dall, Nautilus, xii. p. 27 (1898)[2].

"More evenly divided by the keel, more depressed and larger" than *P. eolina* or *P. sallæana*, varying in colour from pale lemon to deep orange.
Diam. 30, alt. 11 millim.

Hab. N. Central Mexico: Pilitla near San Luis Potosi (*E. W. Nelson*[1 2]).

Proserpina (Proserpinella) berendti (p. 45).

Proserpinella berendti, Fischer & Crosse, Miss. Scient. Mex., Moll. ii. p. 377, t. 54. figg. 1, 1 *a–d*[4].

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* The name of this place was incorrectly given as "Cerro de Plumas" for this and other species in the earlier part of this volume, as supposed by Fischer and Crosse.

GLANDINA (p. 46).

Glandina sowerbyana (p. 55).

Glandina sowerbyana, Biolley, Mol. terr. y fluv. de Costa Rica, p. 5 (1897) [13].

To the localities given, add:—

Hab. N.E. Costa Rica: San Carlos and Sarapiqui (*Biolley* [13]); Puerto Viejo, at the foot of trees (*Biolley*).

[E. Costa Rica:] Turrialba and Reventazon, 500 metres (*Biolley* [13]).

Central Costa Rica: San José, 1161 metres (*Biolley* [13]).

S.W. Costa Rica: Turubares, 250 metres (*Biolley* [13]); Alto de Mano Tigre, 690 metres, and Terraba, 200–300 metres (*Pittier*, 1891); El Pital, in the valley of the Rio Naranjo (*Pittier*, 1893).

Biolley [13] states that this species, the largest and finest of the genus found in Costa Rica, chiefly inhabits the "tierra caliente," and that all the specimens from the elevated central plain are of smaller size, however full-grown, measuring only 35–40 millim. in length.

Glandina coulteri (p. 56).

Biolley (*loc. cit.* p. 6) enumerates this species also from Costa Rica. This is probably an error in determination, as I have never seen a specimen of it among the various representatives of the genus collected by himself and sent to me for determination by P. Godet of Neufchâtel.

6 (a). **Glandina michoacanensis.**

Glandina michoacanensis, Pilsbry, Proc. Acad. Phil. 1899, p. 397 [1].

"Obesely fusiform, coarsely and irregularly plicate and finely plicatulate longitudinally, the foldlets cut into oblong grains; dark dull reddish, with an irregular pale sutural border."

Long. 48·5, diam. 20·5, apert. 25·7 millim.

Hab. Central Mexico: Uruapam, State of Michoacan (*Mr. & Mrs. Rhoads* [1]).

Glandina ghiesbreghti (p. 58).

Glandina ghiesbreghti, Pilsbry, Proc. Acad. Phil. 1892, p. 338 [6]; and in Nautilus, xiii. p. 139 [7].

To the locality given, add:—

Hab. S.E. Mexico: San Juan Bautista in Tabasco (*Rovirosa* [6 7]).

Glandina decussata (p. 58).

Pilsbry [Nautilus, x. p. 59 (1896)] mentions a species of the *decussata*-group of this genus, not adult, found by Prof. Townsend at San Rafael, Jicaltepec, Vera Cruz; this may belong to Strebel's *G. tenella*. Stearns [Proc. U.S. Nat. Mus. xiv. p. 95 (1891)]

states that *G. decussata* has also been found in Texas, in the Painted Cave, at the mouth of the Pecos river, by W. Lloyd.

Glandina cumingi (p. 59).

To the localities given, add:—

Hab. Central Nicaragua: Managua (*Rothschuh*).

S.W. Costa Rica: Alto de Mano Tigre, near Terraba, 690 metres (*Pittier*, 1893).

[Panama:] Chiriqui (*Schlüter*).

Glandina liebmanni (p. 61).

Glandina liebmanni, Rolle, Nachrichtsbl. deutsch. malak. Ges. 1895, p. 129 [12].

To the localities given, add:—

Hab. [S.W. Mexico:] Colima (*Rolle* [12]).

Glandina audebardi (p. 62).

Glandina audebardi, Rolle, Nachrichtsbl. deutsch. malak. Ges. 1895, p. 129 [20].

To the localities given, add:—

Hab. [S.W. Mexico:] Colima (*Rolle* [20]: forms *a* and *b*).

16 (A). Glandina rhoadsi.

Glandina rhoadsi, Pilsbry, Proc. Acad. Phil. 1899, p. 395 [1].

Near *G. longula*, but without trace of spiral striation; suture only weakly crenulate, not marginate; smoother than *G. liebmanni* and *G. audebardi*.

Long. 45–52, diam. 16½–18, apert. 23–24 millim.

Hab. N.E. Mexico: Diente, near Monterey, State of Nuevo Leon (*Mr. & Mrs. Rhoads* [1]).

16 (B). Glandina pittieri, sp. n. (Tab. XLIV. fig. 5.)

Shell nearly cylindrical, with crowded fine vertical striæ, yellow; suture finely crenulated and distinctly margined by a spiral furrow below it; 7 whorls, the uppermost forming a very obtuse summit, the penultimate comparatively long, just above the aperture, ⅔ as long as the antepenultimate, last whorl comparatively shorter; aperture distinctly less than half the length of the whole shell; columellar margin well arcuated, very obliquely truncated.

Long. 40, diam. 14, apert. 17 millim.

Hab. E. Costa Rica: between Mokri and Ukatschka, near Talamanca (*Pittier*, Sept. 1898, *in Mus. Berol.*).

Glandina largillierti (p. 67).

Glandina cylindracea (Phillips), Pilsbry, Proc. Acad. Phil. 1891, p. 311 [24].

To the localities given, add:—

Hab. [Yucatan:] Tekanto, Tabi, Ticul, Tunkas, Sitilpech, Izamal, Labna, and Merida (*Heilprin* [24]).

28 (A). **Glandina dalli.**

Glandina dalli, Pilsbry, Proc. Acad. Phil. 1899, p. 396 [1].

Near *G. bellula*, but of narrower form, with longer and narrower aperture ; suture simple ; also more lengthened than *G. oblonga* and not so stout as *G. ambigua*.
Long. 16–20, diam. 6·2–6·3, apert. 9·5–9·8 millim.

Hab. N.E. Mexico : Diente, near Monterey (*Mr. & Mrs. Rhoads* [1]).

Glandina aurantiaca (p. 69).

Glandina aurantiaca, Biolley, Mol. terr. y fluv. de Costa Rica, p. 6 (1897) [2].

To the locality given, add :—

Hab. N.E. Costa Rica : Puerto Viejo, from the mouth of the river of this name to the Rio Sarapiqui (*Biolley* [2]); San Miguel, on the road to the Rio Sarapiqui (*Biolley*).
E. Costa Rica : Turrialba and Tuis, 500–650 metres (*Biolley* [2], *Pittier*) ; Santa Clara, 200–500 metres (*Biolley* [2]) ; Talamanca (*Pittier*).
S.W. Costa Rica : Valley of Baca (*Pittier*, January 1898) ; Terraba (*Pittier*, 1891).

Specimens received from Talamanca and Turrialba measure 29–30 millim. in length and 13 in diameter, the aperture 15–16 millim.

30 (A). **Glandina underwoodi.**

Glandina sp., Biolley, Mol. terr. y fluv. de Costa Rica, p. 6 (1897) [1].
Oleacina underwoodi, Fulton, Ann. & Mag. Nat. Hist. (6) xx. p. 212, t. 6. fig. 9 (1897) [2].

Near *G. aurantiaca*, but broader and of a uniform dark chestnut-brown colour ; suture marked by a furrow.
Long. 21, diam. 10½–11, apert. 9½ millim.

Hab. Central Costa Rica : Azahar de Cartago, 1500 metres (*Biolley* [1], *Underwood* [2]).

30 (B). **Glandina chiriquiana.**

Glandina chiriquiana, S. I. Da Costa, Proc. Malac. Soc. Lond. iv. p. 66, t. 7. fig. 2 (1900) [1].

Very like *G. underwoodi*, but smaller and with the pillar-lip white.
Long. 19·5, diam. 9 ; apert. long. 9, lat. 4·5 millim.

Hab. S. Panama : Chiriqui [1].

Glandina speciosa (p. 71).

Glandina (*Varicella*) *speciosa,* Pilsbry, Proc. Acad. Phil. 1891, p. 311 [6].

Pilsbry's specimens were from Orizaba (*Heilprin* [6]), whence I have already recorded the species.

35 (A). **Glandina iheringi.**

Glandina iheringi, Pilsbry, Nautilus, xiv. p. 4 (1900) [1].

Somewhat allied to *G. cordovana* and *G. speciosa*, biconic, striated to the base, with occasional dark chestnut or purplish-brown varices.
Long. 22, diam. 12½, apert. 14½ millim.

Hab. N. Guatemala : Alta Vera Paz (*v. Ihering* [1]).

Glandina albersi (p. 75).

Glandina albersi, Rolle, Nachrichtsbl. deutsch. malak. Ges. 1895, p. 129 [3].

To the localities given, add :—

Hab. S.W. Mexico: Colima (*Rolle* [1]).

Var. *solidior*.

Glandina albersi, var. *solidior*, Rolle, loc. cit. p. 129 [3].

Shell thicker and narrow, penultimate whorl longer.
Long. 40 millim.

Hab. S.W. Mexico: Colima (*Rolle* [3]).

Glandina monilifera, var. **pulcherrima** (p. 76).

To the localities given, add :—

Hab. Central Costa Rica: Alajuela, 900 metres (*Pittier*).

SALASIELLA (p. 81).

Salasiella joaquinæ (p. 81).

Salasiella joaquinæ, Fischer & Crosse, Miss. Scient. Mex., Moll. ii. p. 663, t. 71. figg. 3, 3 *a*, *b* [2].

Salasiella perpusilla (p. 83).

Oleacina perpusilla, Ancey, Ann. de Malac. ii. p. 245 (1886) [6].
Glandina (*Salasiella*) *perpusilla*, Pilsbry, Proc. Acad. Phil. 1891, p. 311 [7].

To the localities given, add :—

Hab. [E. Mexico:] Hills around Orizaba (*Heilprin* [7]).
Honduras: Utila Island (*Simpson* [6]).

The specimens from Utila measure 5 millim. in length and 2 in diameter.

Salasiella pulchella (p. 83).

Salasiella pfeifferi, Pilsbry, Proc. Acad. Phil. 1899, p. 398 [4].

To the locality given, add :—

Hab. S.W. Costa Rica: Turubares (*Biolley*).

Pilsbry has changed the name of this species, which was first described as an *Achatina* by Dr. Pfeiffer, on account of the prior *Achatina pulchella*, Spix; but as the latter is an *Ortalichus*, and therefore not likely to be confounded with a *Salasiella*, this alteration is not necessary.

6. **Salasiella elegans.** (Tab. XLIV. figg. 1, 1 *a*.)

Salasiella elegans (v. Martens), Rolle, Nachrichtsbl. deutsch. malak. Ges. 1895, p. 129 [1].

Turrite, very shining, not at all granulatad, yellow; spire obtusely convex: suture moderately impressed; columella much excavated.
Long. 11½, diam. 3½, apert. 4 millim.

Hab. S.W. Mexico: Colima (*Rolle* [1]).

STREPTOSTYLA (p. 83).

The subgenus *Oryzosoma* of Pilsbry is here treated as a separate genus, vide *infrà*, p. 640.

Streptostyla nigricans (p. 90).

Streptostyla nigricans, Pilsbry, Proc. Acad. Phil. 1892, p. 338 [13].

To the localities given, add :—

Hab. [S.E. Mexico :] Mountains of Tabasco (*Rovirosa* [13]).

Streptostyla mitræformis (p. 90).

Streptostyla mitræformis, Biolley, Mol. terr. y fluv. de Costa Rica, p. 6 (1897) [6].

To the localities given, add :—

Hab. Central Costa Rica: La Palma, 1600 metres (*Biolley* [6]); Azahar de Cartago (*Biolley*).

Biolley [6] states that this and other species of the genus live at the roots of trees, in moss or on the underside of decaying leaves, and never in numbers together.

Streptostyla delattrei, var. **edwardsiana** (p. 91).

Streptostyla edwardsiana, Pilsbry, Proc. Acad. Phil. 1891, p. 311 [15].

Pilsbry's specimens were from Orizaba (*Heilprin* [15]), whence I have already recorded it.

8 (A). **Streptostyla novoleonis.**

Streptostyla novoleonis, Pilsbry, Proc. Acad. Phil. 1899, p. 397 [1].

Near *S. shuttleworthi*, but short in the spire, markedly cylindrical, with the columella only weakly twisted.
Long. 16–17, diam. 6·7–7, apert. 11·8–12 millim.

Hab. N.E. Mexico: Diente near Monterey, State of Nuevo Leon (*Mr. & Mrs. Rhoads* [1]).

This is by far the most northern locality for a species of the present genus.

Streptostyla turgidula (p. 95).

Streptostyla turgidula, Biolley, Mol. terr. y fluv. de Costa Rica, p. 7 (1897) [9].

To the localities given, add :—

Hab. Central Costa Rica: La Palma, 1600 metres, Tarbaca, 1700 metres, and Azahar de Cartago (*Biolley* [9]).

Streptostyla labida (p. 96).

Streptostyla labida, Biolley, Mol. terr. y fluv. de Costa Rica, p. 7 [6].

To the locality given, add:—

Hab. Central Costa Rica: Slope of the Volcan de Barba, at an elevation of 1600 metres (*Biolley* [6]).

Streptostyla lurida (p. 96).

To the localities given, add:—

Hab. N.E. Costa Rica: San Miguel (*Biolley*).

15 (A). **Streptostyla chiriquiana**, n. n.

Streptostylus flavescens, S. I. Da Costa, Proc. Malac. Soc. London, iv. p. 66, t. 7. fig. 1 (1900) (nec Shuttl., 1852) [1].

Nautilus, vol 40, 1927, p. 130

Swollen, yellowish.

Long. 22, diam. 11, apert. 11 millim.

Hab. N. Panama: Chiriqui [1].

15 (B). **Streptostyla nebulosa.**

Streptostyla nebulosa, Dall, Proc. U.S. Nat. Mus. xix. p. 364, t. 33. fig. 4 (1896) [1].

Near *S. lurida* (*bocourti*), but of more oval form, less pointed, and with a less elevated spire.

Long. 22, diam. 10 millim.

Hab. S.E. Mexico: San Cristobal, Chiapas (*E. W. Nelson* [1]).

Streptostyla delibuta (p. 97).

Streptostyla delibuta, Biolley, Mol. terr. y fluv. de Costa Rica, p. 7 [4a].

Hab. Central Costa Rica: Slope of the Volcan de Irazu and of the Volcan de Barba, 1500 to 2000 metres, Tarbaca and Azahar de Cartago [4a], 1500 to 1700 metres, and El Roble, between the Volcan de Irazu and Turrialba, 1700 metres (*Biolley*).

Var. *crassa* (p. 97).

To the localities given, add:—

Hab. Central Costa Rica: La Palma (*Biolley*).

Streptostyla ventricosula (p. 97).

Streptostyla ventricosula, Biolley, Mol. terr. y fluv. de Costa Rica, p. 7 [6].

To the localities given, add:—

Hab. [Central Costa Rica:] La Palma (*Biolley* [6]: var. major).

The commonest species of the genus in Central Costa Rica.

Streptostyla viridula (p. 98).

Streptostyla viridula, Biolley, Mol. terr. y fluv. de Costa Rica, p. 7 [2].

To the localities given, add:—

Hab. N.E. Costa Rica: Puente de Tierra, on the road to the Rio Sarapiqui, 600 metres (*Biolley* [2]).

E. Costa Rica: Tuis, 600 metres (*Biolley* [2]); Schkuluk in Alta Uren (*Pittier*, 1898); between Mokri and Ukatschka, Alta Talamanca (*Pittier*, 1898).

Central Costa Rica: La Hondura, on the Carrillo road, 1000 metres (*Biolley* [2]); slopes of the Volcan de Barba (*Biolley, in Mus. Berol.*).

Streptostyla flavescens, var. **boucardi** (p. 99).

To the localities given, add:—

Hab. E. Costa Rica: Cabeceras de Tarazu, 2000 metres (*Biolley*).

Central Costa Rica: Alajuela (*Pittier*, 1893); Tarbaca (*Biolley*).

S.W. Costa Rica: Diquis, below Terraba, 100 metres, and Cañas Gordas, 1200 metres (*Pittier*).

Streptostyla physodes (p. 99).

Streptostyla physodes, Pilsbry, Proc. Acad. Phil. 1891, p. 311 [12].

To the localities given, add:—

Hab. [E. Mexico:] Orizaba (*Heilprin* [12]); Atoyac (*H. H. Smith*).

Streptostyla sololensis (p. 101).

To the localities given, add:—

Hab. S.W. Costa Rica: at the foot of large trees in the forest of Palmar, in the valley of the Rio Grande de Terraba (*Pittier*).

Streptostyla meridana, var. **cobanensis** (p. 101).

To the localities given, add:—

Hab. E. Costa Rica: Bruschik in Alta Tararia (*Pittier*, Sept. 1898).

Streptostyla vexans (p. 102).

Streptostyla vexans, Pilsbry, Proc. Acad. Phil. 1891, p. 311 [2].

To the localities given, add:—

Hab. [E. Mexico:] Orizaba (*Heilprin* [2]); Vera Cruz (*Höge*).

Streptostyla sargi (p. 102).

Streptostyla sargi, Fischer & Crosse, Miss. Scient. Mex., Moll. ii. p. 662, t. 71. figg. 1, 1 *a* [4].

Var. *pallidior*.

Streptostyla sargi, var. *pallidior*, Crosse & Fischer, Journ. de Conch. xxiv. p. 384, t. 11. figg. 1 *b*, *c* (1876) [5]; Miss. Scient. Mex., Moll. ii. p. 662, t. 71. figg. 2, 2 *a* [6].

Pale coloured, with longitudinal whitish streaks.
Long. 16, diam. 6, apert. 7 millim.

Hab. N. Guatemala: Coban (*Sarg* [5 6]).

Var. *championi*, n. (Tab. XLIV. fig. 4.)

Comparatively a little more ventricose, golden-yellow, with faint paler streaks.
Long. 15, diam. 6, apert. 7 millim.

Hab. N. Guatemala: Sabo in Vera Paz (*Champion*).

33 (A). **Streptostyla (Pittieria) bicolor,** sp. n. (Tab. XLIV. fig. 6.)

Testa turrita, solidiuscula, levissime striatula, nitida, rufescenti-fusca, zona subsuturali lata sulphurea; spira elongate conica, apice obtusiuscula; anfr. $7\frac{1}{2}$, primus minutus, papillæformis, secundus globosus, ambo unicolores, fusci, sequentes regulariter crescentes, paululum convexiusculi, sutura appressa, sulco marginata, ultimus basi sensim attenuatus, convexiusculus, antice non deflexus; apertura subperpendicularis, elliptica, sed superne et basi angulata, peristomate simplici, obtuso, intus fusco-limbato, fauce griseo-cærulescenti, margine externo supra leviter, infra magis arcuato, marg. basali rostratim producto, marg. columellari leviter incrassato et levissime spiratim torto, basi truncato.

Long. 21, diam. $10\frac{1}{3}$; apert. long. 10, diam. $5\frac{1}{2}$ millim.

Hab. E. Costa Rica: Uiskar in Alta Talamanca (*Pittier*, 1898).

A very handsome shell, but difficult to place, for which I propose the new subgeneric name *Pittieria*. In the scheme of coloration and the smooth shining surface it agrees with various species of *Streptostyla*, e. g. *S. nigricans* and *S. mitræformis*; but the columella is scarcely twisted and at the lower end distinctly truncate.

From *Glandina* it differs in the very smooth shell, without granulation, and in the columella not being concavely bent.

OMPHALINA (p. 104).

5 (A). **Omphalina montereyensis.**

Omphalina montereyensis, Pilsbry, Proc. Acad. Phil. 1899, p. 395 [1].

Near *O. paradensis*, but much more depressed.
Diam. 12, alt. 6 millim.

Hab. N.E. Mexico: Diente, near Monterey, State of Nuevo Leon (*Mr. & Mrs. Rhoads* [1]).

Omphalina modesta (p. 110).

Omphalina modesta, Biolley, Mol. terr. y fluv. de Costa Rica, p. 7 [3].

To the localities given, add:—

Hab. N.E. Costa Rica: La Paz, 750 metres (*Biolley* [3]).

Central Costa Rica: La Palma, 1600 metres (*Biolley* [3]).

Found at the foot of trees and beneath decayed leaves and trunks (*Biolley* [3]).

Omphalina veracruzensis, var. **jalapensis** (p. 111).

Zonites (*Zonyalina*) *jalapensis*, Fischer & Crosse, Miss. Scient. Mex., Moll. ii. p. 663, t. 71. figg. 4, 4 *a–c* [5].

Omphalina carinata (p. 113).

Zonites (*Patulopsis*) *carinatus*, Fischer & Crosse, Miss. Scient. Mex., Moll. ii. p. 663, t. 71. figg. 5, 5 *a* [2].

HYALINIA (p. 113).

Hyalinia glomerula (p. 115).

Hyalinia glomerula, Biolley, Mol. terr. y fluv. de Costa Rica, p. 8 [1].

To the locality given, add :—

Hab. E. Costa Rica: Tuis and Turrialba, 550 to 600 metres (*Biolley* [1]).

Central Costa Rica: La Palma, 1600 metres (*Biolley* [1]).

Hyalinia hoffmanni (p. 115).

Hyalinia hoffmanni, Biolley, Mol. terr. y fluv. de Costa Rica, p. 8 [1].

To the localities given, add :—

Hab. E. Costa Rica: Tuis, 800 metres (*Biolley*).

Central Costa Rica *: San José, 1160 metres (*Biolley* [1]).

S.W. Costa Rica: El Pital, valley of the Rio Naranjo, 200 metres (*Pittier*, 1893).

Hyalinia arborea (p. 116).

Hyalinia arborea, Biolley, Mol. terr. y fluv. de Costa Rica, p. 8 [14].

To the localities given, add :—

Hab. Central Nicaragua: Matagalpa (*Rothschuh, in Mus. Berol.*).

Central Costa Rica: common at an elevation of from about 1500 metres upwards, on the slope of the Volcan de Irazu and on that of the Volcan de Barba (*Biolley* [14]); La Palma, under moss, *Cacti*, or the decaying trunks of trees, 1500 metres (*Biolley* [14], *Pittier*).

S.W. Costa Rica: Quebrada de Java, in the valley of the Rio Brus, 900 metres, under felled trunks (*Pittier*); Cañas Gordas, in the savana region (*Pittier*).

E. Costa Rica: Waldeck, near Madre de Dios, under old *Cactus* (*Pittier*).

Hyalinia indentata (p. 117).

Hyalinia indentata, Biolley, Mol. terr. y fluv. de Costa Rica, p. 8 [11].

To the localities given, add :—

Hab. Central Costa Rica: San Cristobal, south-east of San José, and on the slope of the Volcan de Barba, 1500 metres (*Biolley* [11]).

* The locality "El Roble" previously cited (p. 115) is also in Central Costa Rica.

Hyalinia stolli (p. 118).

Hyalinia stolli, Biolley, Mol. terr. y fluv. de Costa Rica, p. 8 [1].

To the localities given, add :—

Hab. N.E. Costa Rica: Puerto Viejo, in the "tierra caliente" (*Biolley* [1]).

Biolley [1] also gives San José as a locality, whence I have already recorded the species.

GUPPYA (p. 118).

Guppya championi (p. 119).

Guppya championi, Biolley, Mol. terr. y fluv. de Costa Rica, p. 9 [1].

To the localities given, add :—

[Central Costa Rica:] San Cristobal and Tarbaca, to the south of San José, 1500 to 1800 metres, in half-cleared localities, beneath rotten trunks and decaying leaves (*Biolley* [1]).

Guppya trochulina (p. 120).

Guppya trochulina, Biolley, Mol. terr. y fluv. de Costa Rica, p. 9 [10].

To the localities given, add :—

Hab. N.E. Costa Rica: Puerto Viejo (*Biolley* [10]).

E. Costa Rica: between Mokri and Ukatschka, Alta Talamanca (*Pittier*, Sept. 1899).

[Central Costa Rica:] La Palma, 1600 metres (*Biolley* [10]); San Cristobal, 1800 metres (*Biolley*); San Francisco de Guadelupe, near San José, in hedges (*Pittier*).

S.W. Costa Rica: El Pital, valley of the Rio Naranjo, 200 metres (*Pittier*); Quebrada de Java, in the valley of the Rio Brus, 900 metres (*Pittier*).

Guppya angasi (p. 120). (Tab. XLIV. fig. 2.)

Hyalinia (*Stenopus*) *angasi*, Tryon, Manual of Conch. (2) ii. p. 182, t. 54. fig. 17 (copied from Angas) (1886) [2].

To the locality given, add :—

Hab. [E. Costa Rica:] between Mokri and Ukatschka, Alta Talamanca (*Pittier*, Sept. 1898).

S.W. Costa Rica: Quebrada de Java, 900 metres, Cañas Gordas (*Pittier*).

In renaming this species *angasi* (*anteà*, p. 120) I was unaware of the fact that this had already been done by Tryon, and for the same reason, viz. that "*guildingi*" was preoccupied. I figure a specimen which seems to belong to it, the one given by Angas not being very satisfactory. It is recognizable by the narrow whorls, and by the distinct keel of the last one.

Guppya pittieri (p. 121).

Guppya pittieri, Biolley, Mol. terr. y fluv. de Costa Rica, p. 9 [1].

Guppya biolleyi (p. 121).

Guppya biolleyi, Biolley, Mol. terr. y fluv. de Costa Rica, p. 9 [1].

To the localities given, add :—

Hab. N.E. Costa Rica: Sarapiqui, 200 metres (*Biolley* [1]).

Guppya micans (p. 121). (Tab. XLIV. fig. 3.)

To the localities given, add :—

Hab. E. Costa Rica: Bruschik, Alta Tararia (*Pilsbry*, Sept. 1898).

I refer to this species two Costa Rican specimens collected by H. Pittier at the above-mentioned locality, the larger one being here figured. They are very shining, and of a golden-yellow colour, distinctly perforated and rounded at the periphery, as in the figure given by Angas.

[12. **Guppya hopkinsi.**

Guppya hopkinsii, Dall, Proc. Acad. Phil. 1900, p. 97, t. 8. figg. 5, 6, and p. 105 (anatomy) [1].

Depressed, of reddish horn-colour, shining below, periphery rounded.
Diam. 6, alt. 4½ millim.

Hab. Cocos Island: on leaves (*Heller & Snodgrass*, 1899 [1]).

This is probably the *Conulus* sp. found by H. Pittier on the same island (*cf.* v. Martens, Sitzungsberichte naturf. Freunde zu Berlin, 1898, p. 156). The locality, which is about midway between the Isthmus of Panama and the Galapagos Is., can hardly be regarded as belonging to our region, still there is no harm in mentioning the species here.]

PSEUDOHYALINA (p. 124).

Pseudohyalina minuscula (p. 124).

Pseudohyalina minuscula, Biolley, Mol. terr. y fluv. de Costa Rica, p. 8 [28].

To the localities given, add :—

Hab. Central Costa Rica: San José, 1161 metres, beneath dead leaves, and on the slope of the Volcan de Barba, 1500 metres (*Biolley* [28]).

S.W. Costa Rica: Rio Naranjo, 200 metres (*Pittier*).

Pilsbry [Manual of Conchology, (2) ii. p. 202] says that it is also found in Venezuela.

PATULA (p. 126).

Pilsbry, in Tryon's 'Manual of Conchology,' (2) ix. p. 42, substitutes the name *Pyramidula*, Fitzinger (1833), for *Patula*, Held (1837). Fitzinger, led chiefly by the external form, proposed *Pyramidula* for the pyramidal *Helix rupestris*, *Discus* for the flat, blunt-angulated *H. rotundata*, and *Gonyodiscus* for the flat, sharply-keeled *H. perspectiva*, Meg.=*solaria*, Menke, and he placed the two latter far distant from the first. Held recognized the natural affinity of all three and named the whole *Patula*. *Pyramidula* has precedence only for a subdivision, including *H. rupestris*, but excluding *H. rotundata* and *H. solaria*, and to use it in the extended sense of *Patula* is really not a rehabilitation, but a mere innovation.

Pilsbry (*loc. cit.* p. 54) also unites the species enumerated by me under the subgenus *Thysanophora*, of *Patula* (*anteà*, pp. 128, 129), with those referred to the subgen. *Acanthinula*, of *Helix* (*anteà*, pp. 130–132), under the one genus, *Thysanophora*, and includes in it *Microphysa*, Albers; he says that they are widely separated from *Pyramidula* (*Patula*) by the absence of a parapodial groove, but it has not been ascertained as yet that this is the case in Mexican and Central-American forms. He places *Thysanophora* in his tribe "Teleophallogona" of the Helicidæ.

1 (A). **Patula strigosa.**

Helix strigosa, A. Gould, Proc. Bost. Soc. Nat. Hist. 1846, p. 18 [1]; U.S. Expl. Exped., Mollusca, p. 36, t. 3. figg. 41, 41 *a*, *b* [2]; Pfr. Monogr. Helic. Vivent. i. p. 121 [3]; Binney, Terr. Moll. N. Am. iv. p. 23, and v. t. 26 *a* [4]; Land and Freshw. Shells N. Am. i. p. 72, fig. 121 [5].

Patula strigosa, Binney, Manual Am. Land Shells, p. 165, fig. 151 [6]; Dall, Proc. U.S. Nat. Mus. xix. p. 335 [7].

A large species of about 25 millim. in diameter and 13 in height, variable in coloration, usually with several narrow dark spiral bands.

Hab. N.W. Mexico: San José Mountain, Sonora (*Dr. Mearns* [7]).

Extends northward from New Mexico, on the Rio Pedro, to the British possessions in N.W. America, and eastward of the Rocky Mountains at least as far as long. 108°, and also occurs in Eastern Oregon [1–6].

According to Binney [6] it is viviparous.

Patula wilhelmi (p. 128).

Patula wilhelmi, Biolley, Mol. terr. y fluv. de Costa Rica, p. 10 [5].

Patula (Thysanophora) conspurcatella (p. 128).

Thysanophora conspurcatella, Pilsbry, Nautilus, xiii. p. 139 (1900) [7].

To the localities given, add:—

Hab. S.E. Mexico: San Juan Bautista (*Rovirosa* [7]).

4 (A). **Patula (Thysanophora) proxima.**

Thysanophora proxima, Pilsbry, Proc. Acad. Phil. 1899, p. 394[1].

"Similar to *T. conspurcatella*, but with more elevated spire, narrower umbilicus, and far wider spaced, oblique, cuticular riblets."

Diam. 3·1, alt. 2·8 millim. Whorls $4\frac{1}{2}$.

Hab. CENTRAL MEXICO: Uruapam, Morelia, Patzcuaro, and Huango [Huingo], State of Michoacan (*Mr. & Mrs. Rhoads* [1]).

The same author indicates also a species allied to *T. cæca* from Morelia, Michoacan, but does not name it.

Patula (Thysanophora) paleosa (p. 129).

Patula paleosa, Fischer & Crosse, Miss. Scient. Mex., Moll. ii. p. 664, t. 71. figg. 10, 10 *a–c*[2].

These authors' specimens were from Jalapa, whence I have already recorded the species.

HELIX (p. 129).

Subgen. ACANTHINULA (p. 130).

Helix punctum (p. 131).

To the localities given, add:—

Hab. CENTRAL COSTA RICA: San José, under dead leaves (*Biolley*); San Francisco Guadelupe, near San José, in hedges, 1200 metres (*Pittier*).

Helix guatemalensis (p. 132).

Helix guatemalensis, Fischer & Crosse, Miss. Scient. Mex., Moll. ii. p. 664, t. 71. figg. 9, 9 *a*, *b*[4].

Subgen. TRICHODISCINA (p. 133).

Pilsbry, in Tryon's 'Manual of Conchology,' (2) ix. pp. 196–199, places *Trichodiscina* as a section of the larger genus *Epiphragmophora*, Döring (subdivision "Belogona Euadenia" of the Helicidæ), which comprises many *Campylæa*-like South-American species of the old genus *Helix*; but he remarks, at the same time, that *Trichodiscina* cannot be certainly placed till its anatomical characters are better known.

Helix cordovana (p. 135).

Helix (*Trichodiscina*) *cordovana*, Rolle, Nachrichtsbl. deutsch. malak. Ges. 1895, p. 130[8].

To the localities given, add:—

Hab. [E. MEXICO:] Atoyac (*Höge*).

S.W. MEXICO: Colima (*Rolle* [8]).

Helix suturalis (p. 136).

Helix suturalis, Biolley, Mol. terr. y fluv. de Costa Rica, p. 10[5a].

To the localities given, add :—

Hab. N.E. Costa Rica: Puerto Viejo, 121 metres (*Biolley*[5a]).

Helix sumichrasti (p. 137).

Helix (*Trichia*) *sumichrasti*, Fischer & Crosse, Miss. Scient. Mex., Moll. ii. p. 664, t. 71. figg. 8, 8 *a*[3].

Helix sargi (p. 137).

Helix (*Aglaia*) *sargi*, Fischer & Crosse, Miss. Scient. Mex., Moll. ii. p. 664, t. 71. figg. 6, 6 *a*, *b*[4].

Helix macneili (p. 137).

Helix macneili, Biolley, Mol. terr. y fluv. de Costa Rica, p. 10[5].

Epiphragmophora (*Averellia*) *macneili*, Pilsbry, in Tryon's Manual of Conch. (2) ix. p. 197[6].

To the localities given, add :—

Hab. [E. Costa Rica:] Tuis, 600 metres (*Biolley*[5]).

[S.W. Costa Rica:] Alto de Mano Tigre, 690 metres (*Pittier*).

Pilsbry[6] adopts a distinct subgenus (*Averellia*, Ancey) for this very peculiar species, leaving it, however, close to *Trichodiscina*.

Subgen. Praticolella (p. 138).

This division is placed by Pilsbry, in Tryon's 'Manual of Conchology,' (2) ix. pp. xxxiii and 67, as a distinct genus in the tribe Protogona of the Helicidæ, wanting flagellum, dart, and mucous glands.

Helix ampla (p. 138).

Praticolella ampla, Pilsbry, Nautilus, x. p. 59 (1896)[5].

Helix (*Patula*) *ampla*, Fischer & Crosse, Miss. Scient. Mex., Moll. ii. p. 663, t. 71. figg. 8, 8 *a*[6].

To the localities given, add :—

Hab. [E. Mexico:] San Rafael, Jicaltepec (*Cockerell*[5]).

14 (A). **Helix strebeliana.**

Praticolella strebeliana, Pilsbry, Proc. Acad. Phil. 1899, p. 394[1].

Near the preceding (*H. ampla*), rather depressed, pale corneous.
Diam. 10·2–12, alt. 6·5–7·5 millim.

Hab. N.E. Mexico: Diente, near Monterey, State of Nuevo Leon (*Mr. & Mrs. Rhoads*[1]).

Helix berlandieriana, var. **griseola** (p. 140).

Helix (?) (*Praticola*) *griseola*, Pilsbry, Proc. Acad. Phil. 1891, p. 313[39].

Praticolella griseola, Pilsbry, Nautilus, x. p. 59[40].

To the localities given, add:—

Hab. [E. Mexico:] San Rafael, Jicaltepec (*Cockerell* [40]).

[S.E. Mexico:] San Carlos, due east of Oaxaca, in open country with shrubby vegetation of *Cacti* and *Mimosæ* (*Höge*).

N.W. Costa Rica: Guanacaste (*Mus. Berol.*: from a dealer).

Pilsbry's specimens [39] were from Vera Cruz, whence I have already recorded the species.

Subgen. Arionta (p. 142).

Pilsbry, in Tryon's 'Manual of Conchology,' (2) ix. p. 67, places *H. flavescens* in the subgenus *Praticolella* (see *anteà*, p. 623); and (*loc. cit.* pp. 199, 200) *H. trypanomphala* and *H. magdalenensis* in the subgenus *Epiphragmophora*, with the other North-American *Ariontæ*.

Helix magdalenensis (p. 144).

Epiphragmophora magdalenensis, Dall, Proc. U.S. Nat. Mus. xix. p. 339 [2].

Of this species Mr. Dall [2] notices a variety from the San José Mountain, Sonora (*Dr. Mearns*). He states [2] that *H. magdalenensis* also occurs in California, at altitudes between 900 and 6000 feet.

Helix aspersa (p. 145).

Helix aspersa, Stearns, Proc. U.S. Nat. Mus. xiv. p. 96 (1891) [19].

To the localities given, add:—

Hab. [Central Mexico:] Puebla (*Mexican Geographical Commission, U.S. Nat. Mus.* [19]).

The acclimatation of this species at Santiago in Chile has been noted by P. Strobel [Atti della Soc. Ital. Scienze Nat. xi. p. 552 (1868)].

Subgen. Lysinoë (p. 145).

Pilsbry, in Tryon's 'Manual of Conchology,' (2) ix. p. 191, follows me in uniting the three species *humboldtiana*, *eximia*, and *ghiesbreghti* under one group, *Lysinoë*, Adams, to which he gives generic value, at the same time placing it among the "Belogona Euadenia" of the Helicidæ. Von Ihering (1892), on the contrary, and H. Fischer (1899), separate *H. humboldtiana* as a distinct subdivision, *Humboldtiana*, from *Lysinoë*; but they agree also in stating that it differs anatomically from the species of the European group *Pomatia*. The subgeneric name proposed by Fischer and Cross for *H. eximia* and *H. ghiesbreghti* has been changed by H. Fischer (1899) to *Priodontura*, *Odontura* being preoccupied.

Helix humboldtiana (p. 147).

Helix humboldtiana, Stearns, Proc. U.S. Nat. Mus. xiv. p. 96 (1891)[25]; Ihering, Zeitschr. für wissensch. Zool. liv. p. 54 (1892) (anatomy)[26]; Fischer, Journ. de Conch. xlvii. pp. 297–304 (with anatomical figures) (Dec. 1899)[27].

To the localities given, add :—

Hab. Texas, Altada, 5000 feet above the sea (*W. Lloyd* [25]).

Foot of the living animal not provided with a serrated keel as in *H. ghiesbreghti* and *H. eximia.* The anatomical examination of the species [26 27] shows that it cannot be, as suggested by Stearns [25], a form of some European *Pomatia*, introduced by the Spaniards into Mexico.

f. *queretaroana.*

Helix* (*Lysinoë*) *queretaroana, Dall, Nautilus, xi. p. 73 (1897) [28].

Pale yellow-brown, without banding, with more pointed spire and less depressed apex.
Diam. 39, alt. 37 millim.

Hab. Central Mexico: Pinal de Amoles, Queretaro (*Nelson* [28]).

21 (A). **Helix sebastiana.**

Helix* (*Lysinoë*) *sebastiana, Dall, Nautilus, xi. p. 73 (1897) [1].

Of a dark plum hue, which, where covered by the brownish epidermis, appears nearly black, with three whitish bands, the undermost at the periphery; sculpture consisting of irregular minute vermiculations; more depressed than *H. eximia*, and with $4\frac{1}{2}$ whorls only; aperture ample, produced above, the lip slightly thickened, the pillar-lip broadly reflected over a moderate umbilicus.
Diam. 40, alt. 30 millim.

Hab. W. Mexico: San Sebastian, Jalisco (*Nelson* [1]).

Subgen. Oxychona (p. 152).

Pilsbry, 'Nautilus,' xi. p. 87 (1897), has found that the typical species of this subgenus, *Helix bifasciata*, Burrow, from Brazil, agrees in its anatomical characters with *Otostomus auris-leporis*, Brug. It is not likely that the Costa-Rican and Guatemalan forms referred by me to *Oxychona*, which differ somewhat from *H. bifasciata* in the structure of the shell (this not being so very smooth and shining), really belong to the Goniognatha, and they will therefore require a new subgeneric name when their anatomical characters are made out. In his general classification of the Helicidæ ['Manual of Conchology,' (2) ix. p. 189 (1894)], Pilsbry had treated *Oxychona* as a distinct genus among the "Belogona Euadenia."

Helix adela (p. 158).

Helix adela, Biolley, Mol. terr. y fluv. de Costa Rica, p. 10[2].

To the locality given, add :—

Hab. Central Costa Rica: Azahar de Cartago, 1500 metres (*Biolley* [2]).

S.W. Costa Rica: Alto de Sapote, between Bacá and El General, 1200 metres (*Pittier*, Jan. 1898).

Helix costaricensis (p. 158).

Helix costaricensis, Biolley, Mol. terr. y fluv. de Costa Rica, p. 11[7].

To the localities given, add:—

Hab. N.E. Costa Rica: Puente de Tierra, on the road to the Rio Sarapiqui (*Biolley*[7]).

E. Costa Rica: Caché (*Rogers*); Santa Clara, 250 metres (*Biolley*[7]); between Mokri and Ukatschka, and between Uiskar and Mokri, Alta Talamanca (*Pittier*, Sept. 1898); Valley of Tuis (*Pittier*, 1893).

The largest specimen sent by Biolley measures 32 millim. in the greatest and 25 in the least diameter, and 15 millim. in height.

Subgen. Solaropsis (p. 159).

The anatomy of this subgenus or genus being unknown to Pilsbry, he could not give it a definite place in his classification. But my friend Fr. Wiegmann has since examined a specimen of the Brazilian *H.* (*Solaropsis*) *heliaca*, d'Orb., and comes to the conclusion that it belongs to the tribe "Epiphallophora": see Fr. Wiegmann, Nachrichtsblatt der deutsch. malak. Ges. 1900, p. 178.

Helix tiloriensis (p. 159).

To the locality given, add:—

Hab. N.E. Costa Rica: Puerto Viejo, at the confluence of the Rio Viejo and the Rio Sarapiqui, on leaves (*Biolley*).

Helix sigmoides (p. 160).

Pilsbry places this species in the genus *Thysanophora* (see above, p. 621) ['Manual of Conchology,' (2) ix. p. 57].

Helix tenuicostata (p. 161).

According to Pilsbry, in Tryon's 'Manual of Conchology,' (2) ix. p. 184, this doubtful species is synonymous with *H. troscheli*, Pfr., section *Hemitrochus*, from Cuba. But the late Dr. Pfeiffer, who had specimens of both in his own collection, treats the two as distinct, and places them widely apart in his last work (Monogr. Helic. Vivent. vii. pp. 273, 400).

POLYGYRA (p. 162).

This genus belongs to the tribe "Protogona" of Helicidæ: see Pilsbry, in Tryon's 'Manual of Conchology,' (2) ix. p. xxxiii.

Polygyra couloni (p. 167).

To the localities given, add :—

Hab. [E. MEXICO :] Quilate, near Misantla (*Höge*).

Polygyra bicruris (p. 168).

Polygyra bicruris, Rolle, Nachrichtsbl. deutsch. malak. Ges. 1895, p. 130[4].

To the localities given, add :—

Hab. S.W. MEXICO : Colima (*Rolle* [4]).

Polygyra richardsoni (p. 168).

Polygyra richardsoni, Rolle, Nachrichtsbl. deutsch. malak. Ges. 1895, p. 130[1].

To the localities given, add :—

Hab. S.W. MEXICO : Colima (*Rolle* [1]).

Polygyra acutedentata (p. 172).

Helix (*Polygyra*) *unguifera,* Mousson, Journ. de Conch. xxxi. p. 216, t. 9. fig. 1 (1883)[11]; Fischer & Crosse, Miss. Scient. Mex., Moll. ii. p. 665, t. 71. figg. 11, 11 *a, b* [12].

The following species are unknown to me :—

18. **Polygyra nelsoni.**

Polygyra nelsoni, Dall, Nautilus, xi. p. 74 (1897) [1].

Hab. W. MEXICO : San Sebastian, Jalisco (*E. W. Nelson* [1]).

19. **Polygyra rhoadsi.**

Polygyra rhoadsi, Pilsbry, Proc. Ac. Phil. 1899, p. 392 [1].

Hab. N.E. MEXICO : Topo Chico, near Monterey, Nuevo Leon (*Mr. & Mrs. Rhoads* [1]).

Closely allied to *P. implicata.*

20. **Polygyra suprazonata.**

Polygyra suprazonata, Pilsbry, Proc. Acad. Phil. 1899, p. 393 [1].

Reddish-brown, with a wide whitish band along the periphery.
Diam. 10·2–12, alt. 5·7–6·5 millim.

Hab. CENTRAL MEXICO : Tzintzuntzan, State of Michoacan (*Mr. & Mrs. Rhoads* [1]).

21. **Polygyra matermontana.**

Polygyra matermontana, Pilsbry, Proc. Acad. Phil. 1896, p. 16, t. 3. figg. 10–12 [1].

Hab. S.W. MEXICO : Sierra Madre Mountains, Colima [1].

Also stated to occur in Texas [1].

22. **Polygyra ponsonbyi.**

Polygyra ponsonbyi, Pilsbry, Proc. Acad. Phil. 1896, p. 17, t. 2. figg. 1–3 [1].

Hab. Mexico, exact locality not known [1].

23. **Polygyra euglypta.**

Polygyra euglypta, Pilsbry, Proc. Acad. Phil. 1896, p. 18, t. 2. figg. 7–9 [1].

Hab. N.W. Mexico: Sinaloa, Mazatlan [1].

24. **Polygyra albicostulata.**

Polygyra albicostulata, Pilsbry, Proc. Acad. Phil. 1896, p. 18, t. 2. figg. 4–6 [1].

Hab. Mexico, exact locality not known [1].

STROBILA (p. 172).

Pilsbry has renamed this genus *Strobilops*, on account of *Strobila* being preoccupied by Sars for a stage of evolution of *Medusa aurita*; I do not think that this was needed, as *Strobila*, Sars, cannot stand as a distinct genus in the zoological system.

LABYRINTHUS (p. 175).

Pilsbry, in Tryon's 'Manual of Conchology,' (2) ix. pp. xxxv & 94, treats *Labyrinthus* as a section of *Pleurodonte*, Fisch. Waldh., of the tribe "Epiphallophora." Teeth of the radula all unicuspid, as in *Caracolus*, according to Semper.

Labyrinthus triplicatus (p. 176).

Labyrinthus triplicatus, Biolley, Mol. terr. y fluv. de Costa Rica, p. 11 [6].

To the localities given, add:—

Hab. N.E. Costa Rica: San Miguel, on the road to the Rio Sarapiqui, about 500 metres (*Biolley* [6]).

Pittier has sent me a specimen of it, measuring 27 millim. in diameter and 14 in height.

Labyrinthus quadridentatus (p. 176).

Labyrinthus quadridentatus, Biolley, Mol. terr. y fluv. de Costa Rica, p. 11 [5].

To the localities given, add:—

Hab. [S.W. Costa Rica:] Guaitil de Pirris, about 800 metres (*Biolley* [5]); Alto de Mano Tigre, near Terraba, 690–700 metres, in woods (*Pittier*); El Pozo, Rio Grande de Terraba, El Pital, Valley of the Rio Naranjo, 200 metres (*Pittier*).

Var. *minor*.

Diam. maj. $16\frac{1}{2}$, min. 14, alt. 10 millim.

Hab. S.W. Costa Rica: Quebrada Chenarria, Golfito, and banks of the Rio Coto, both near the Golfo Dulce (*Pittier*).

ORTALICHUS (p. 179).

Ortalichus princeps (p. 182).

Orthalicus princeps, Rolle, Nachrichtsbl. deutsch. malak. Ges. 1895, p. 131 [18].
Ortalichus princeps, Biolley, Mol. terr. y fluv. de Costa Rica, p. 11 [19].
Oxystyla princeps, Pilsbry, Nautilus, xiii. p. 139 (1900) [20].

To the localities given, add :—

Hab. S.W. Mexico: Colima (*Rolle* [18]).
S.E. Mexico: State of Tabasco (*Rovirosa* [20]).
N.E. Costa Rica: Region of the Sarapiqui, 100–200 metres (*Biolley* [19]).
E. Costa Rica: Santa Clara (*Biolley* [19]).
S.W. Costa Rica: Rio Grande de Terraba, in the virgin forests, and Alto de Mano Tigre, 690 metres (*Pittier*).
S. Panama: Bugaba (*Champion*).

These additional localities show more completely the distribution of this species, from Mazatlan and Misantla to Panama.

Var. *elegans*. (Tab. XLIV. fig. 15.)
Orthalicus elegans, Rolle, loc. cit. p. 131 [21].

Hab. S.W. Mexico: Colima (*Rolle* [21]).

This is only an attenuated variety of *O. princeps*; I give a figure from Rolle's specimen, now in the Berlin Museum.

Ortalichus tricinctus (p. 185).

To the localities given, add :—

Hab. [Central Nicaragua:] Managua (*Rothschuh, in Mus. Berol.*).

Ortalichus zoniferus (p. 186).

Orthalicus zoniferus, Rolle, Nachrichtsbl. deutsch. malak. Ges. 1895, p. 131 [3]; Fischer & Crosse, Miss. Scient. Mex., Moll. ii. p. 666, t. 72. figg. 7, 7 *a* [4].

To the localities given, add :—

Hab. [S.W. Mexico:] Colima (*Rolle* [3]).

Var. *nobilis*. (Tab. XLIV. fig. 16.)
Orthalicus nobilis, Rolle, loc. cit. p. 131 [5].

Hab. S.W. Mexico: Colima (*Rolle* [5]).

An attenuated variety of *O. zoniferus*, corresponding to the var. *elegans* of *O. princeps*. I figure Rolle's specimen, now in the Berlin Museum.

Ortalichus ponderosus (p. 190).

Orthalicus ponderosus, Rolle, Nachrichtsbl. deutsch. malak. Ges. 1895, p. 130 .

To the localities given, add :—

Hab. [S.W. Mexico :] Colima (*Rolle* [4]).

OTOSTOMUS (p. 191).

Otostomus josephus, var. **concolor** (p. 202).

Otostomus josephus, var. *concolor*, Biolley, Mol. terr. y fluv. de Costa Rica, p. 12 [3].

To the localities given, add :—

Hab. E. Costa Rica: Turrialba, Tuis and Santa Clara (*Biolley* [3]).

Biolley [3] states that he has never found this species in such an elevated locality as San José, a habitat cited by Angas on Boucard's authority.

Otostomus dunkeri, var. **forreri** (p. 207).

Otostomus dunkeri, var. *forreri*, Fischer & Crosse, Miss. Scient. Mex., Moll. ii. p. 666, t. 72. figg. 4, 4 *a* [14].

11 (A). **Otostomus chaperi.**

Bulimulus chaperi, Crosse & Fischer, Journ. de Conch. xl. p. 296 (1892) [1], and xli. p. 31, t. 1. figg. 1, 2 (1893) (living animal) [2]; Fischer & Crosse, Miss. Scient. Mex., Moll. ii. p. 666, t. 72. figg. 5, 5 *a*, *b* [3].

Similar to *Bulimulus proteus*, Brod., in general figure and coloration, but not granulated. Aperture large, lip expanded.

Long. 43, diam. 25 millim.; apert. long. 26, diam. 17–19 millim.

Hab. N. Central Mexico: Mescala Island, in the Laguna de Chapala, State of Jalisco (*Chaper* [1–3]).

11 (B). **Otostomus colimensis.** (Tab. XLIV. fig. 9.)

Otostomus colimensis, Rolle, Nachrichtsbl. deutsch. malak. Ges. 1895, p. 130 [1].

Near *O. chaperi*, Crosse & Fisch., and *O. fenestrellus*, v. Mart., differing from the former in the expanded aperture and from the latter in the more attenuated (not ventricose) form.

Long. 31, diam. 15, apert. 15 millim.

Hab. S.W. Mexico : Colima (*Rolle* [1]).

Otostomus ghiesbreghti, var. **iodostylus** (p. 210).

Otostomus iodostylus, Rolle, Nachrichtsbl. deutsch. malak. Ges. 1895, p. 130 [14].

To the localities given, add :—

Hab. [S.W. Mexico :] Colima (*Rolle* [14]).

Otostomus recluzianus, var. **lineolatus** (p. 213).

Otostomus recluzianus (var. *lineolatus*), Biolley, Mol. terr. y fluv. de Costa Rica, p. 12 [14].

To the localities given, add :—

Hab. Central Costa Rica: common on the high tableland of Costa Rica, better

developed in higher localities; San José, 1161 metres, Azahar de Cartago, 1500 metres, and Tablazo, 1600 metres (*Biolley* [14]).

Otostomus attenuatus (p. 215).

Otostomus attenuatus, Biolley, Mol. terr. y fluv. de Costa Rica, p. 12 [13].

To the localities given, add:—

Hab. [Central Costa Rica:] one of the commonest species of the genus on the central tableland of Costa Rica, and found in the hollow trunks of *Ficus*? ("higueron") and *Erythrina* ("poró"); the typical form of the species at Cartago, 1442 metres, the var. *concolor* isolated in various localities, the var. *varicosus* at San José, the var. *pittieri* at Cartago (*Biolley* [18]) *.

[S.W. Costa Rica:] Valley of Diquis, 800 metres (*Pittier*: var. *pittieri*).

Otostomus costaricensis (p. 217).

Otostomus costaricensis, Biolley, Mol. terr. y fluv. de Costa Rica, p. 13 [7].

Biolley [7] gives Cartago and San José as localities, whence I have already recorded it.

Otostomus emeus (p. 222).

Bulimulus palpalaensis, Fischer & Crosse, Miss. Scient. Mex., Moll. ii. p. 667, t. 72. figg. 6, 6 *a–c* [17].

Otostomus irazuensis (p. 224).

Otostomus irazuensis, Biolley, Mol. terr. y fluv. de Costa Rica, p. 13 [4].

To the localities given, add:—

Hab. [Central Costa Rica:] Tierra Blanca, on shrubs of *Cestrum* sp. ("zorillo"), all the varieties previously indicated by me (*anteà*, p. 224) together, the var. *c* rarer than the others; Pueblo de Cot, also on the slope of the Volcan de Irazu (*Biolley* [4]); Estrella de Cartago (*Biolley*, 1898).

Otostomus tripictus, var. **hoffmanni** (p. 225).

Otostomus tripictus, var. *hoffmanni*, Biolley, Mol. terr. y fluv. de Costa Rica, p. 14 [8].

To the localities given, add:—

Hab. [Central Costa Rica:] Tarbaca, 1700 metres, south of San José, and on the slope of the Volcan de Barba, 1600 metres (*Biolley* [8]).

Otostomus sulfureus (p. 225).

Otostomus sulfureus, Biolley, Mol. terr. y fluv. de Costa Rica, p. 14 [12].

To the localities given, add:—

Hab. N.E. Costa Rica: San Juan, Sarapiqui, 100–200 metres, typical form (*Biolley* [12]).

E. Costa Rica: Turrialba, typical form, Tuis and Santa Clara (*Pittier and Biolley* [12]).

* Among the shells sent by Biolley to P. Godet, of Neufchâtel, the var. *varicosus*, from Cartago, is present.

Central Costa Rica: San José, 1161 metres, and Cartago, 1442 metres, var. *obesus* (*Biolley* [12]); El Tablazo, white specimens (*Biolley* [12]).
W. Costa Rica: San Mateo, 200 metres (*Biolley* [12]).

Biolley [12] states that the var. *citronellus* is the commonest form of *O. sulfureus* in Costa Rica, but that as it ascends the coloration becomes duller. Pilsbry [Nautilus, x. p. 59 (1896)] mentions a peculiar variety from San Rafael, Jicaltepec, E. Mexico, with five reddish bands, the umbilical and basal continuous, those above interrupted and forming square spots. Is this *O. emeus*?

Otostomus alternans (p. 230).

Otostomus alternans, Biolley, Mol. terr. y fluv. de Costa Rica, p. 14 [19].

To the localities given, add:—
Hab. [N. Guatemala:] Sabo in Vera Paz (*Champion*).
[Central Guatemala:] Capetillo, near Antigua (*Champion*).
[Central Costa Rica:] San José, 1161 metres, and Cartago, 1442 metres (*Biolley* [19]).
W. Costa Rica: Valley of Diquis, near Terraba, 100 metres (*Pittier*).

BULIMULUS (p. 238).

Bulimulus schiedeanus (p. 239).

Bulimulus schiedeanus, Binney, Bull. U.S. Nat. Mus. xi. no. 8, p. 160, t. 3. fig. K (jaw and radula) (1883) [25].

Bulimulus alternatus (p. 243).

For further particulars concerning this species, see also Stearns, Proc. U.S. Nat. Mus. xiv. p. 99 (1891).

Dall [Proc. U.S. Nat. Mus. xix. p. 357 (1896)] describes a var. *nigromontanus* from the summit of the Black Mountain, Sonora.

Bulimulus corneus (p. 246).

Bulimulus corneus, Biolley, Mol. terr. y fluv. de Costa Rica, p. 15 [16].

To the localities given, add:—
Hab. [E. Costa Rica:] Turrialba (*Biolley* [16]); Moin Hill, near Limon (*Pittier*).
W. Costa Rica: San Mateo (*Biolley* [16]); Turubares, 200 metres (*Biolley*); Lagarto, on the banks of the Rio Diquis (*Pittier*).

Biolley [16] states that this species is generally found on the ground, whereas the brighter-coloured *Otostomi* live on trees.

Dall [Proc. U.S. Nat. Mus. xix. p. 354 (1896)] states that *Bulimulus pallidior*, Sow., a species inhabiting Lower California, "is represented by a very slightly modified variety on the mainland as far south as Costa Rica"; and that *Bulimulus baileyi* is supposed to have been found at Hermosillo, in Sonora. For the former, see Sowerby, Proc. Zool. Soc. 1833, p. 72; Pfeiffer, Monogr. Helic. Vivent. ii. p. 61; Binney, Land and Freshw. Shells of N. Am. i. p. 195, figg. 340, 341: among the numerous Costa Rican shells received during recent years from H. Pittier and P. Biolley, I have not found anything like it.

EUCALODIUM (p. 254).

Eucalodium blandianum (p. 258).

Eucalodium blandianum, var. *minor*, Fischer & Crosse, Miss. Scient. Mex., Moll. ii. p. 665, t. 72. figg. 2, 2 *a* [7].

Long. 61, diam. 12½, apert. 14 millim.

For this species, Pilsbry and Dall [Nautilus, ix. p. 51 (1895)] propose a new section, *Oligostylus*, the axis in *E. blandianum* being straight and smooth, and the radula narrower (36 lateral teeth, in *E. ghiesbreghti* 65).

2 (A). **Eucalodium sumichrasti.**

Eucalodium sumichrasti, Crosse & Fischer, Journ. de Conch. xxvi. p. 250 (1878) [1]; xxvii. p. 46, t. 2. fig. 2 [2]; Miss. Scient. Mex., Moll. ii. p. 665, t. 72. figg. 1, 1 *a* [3].

Intermediate between *E. blandianum* and *E. decollatum*.
Long. 65, diam. 20, apert. 14 millim. Whorls 8.

Hab. S.E. MEXICO: State of Chiapas (*Sumichrast* [1–3]).

Eucalodium cereum (p. 263).

Eucalodium cereum, Fischer & Crosse, Miss. Scient. Mex., Moll. ii. p. 666, t. 72. figg. 3, 3 *a* [4].

23. **Eucalodium hippocastanum.**

Eucalodium hippocastanum, Dall, Nautilus, xi. p. 61 (1897) [1].

Differs from *E. boucardi* in its smaller size, dark chestnut-brown colour, less sharp sculpture, and the presence of spiral lines.
Long. 32, diam. 9·2, apert. 8 millim.

Hab. W. MEXICO: San Sebastian, State of Jalisco (*E. W. Nelson* [1]).

24. **Eucalodium dalli,** n. n.

Anisospira strebeli, Dall, Proc. U.S. Nat. Mus. xix. p. 353, t. 33. fig. 7 (1896) [1].

Not so large and stout as *E. liebmanni*, shorter and more slender than *E. hyalinum*, whitish, with trumpet-like aperture.
Length (decollated) 29, diam. 10 millim.

Hab. W. MEXICO: Huilotepec, State of Oaxaca (*E. W. Nelson* [1]).

As there is already an *E.* (*Anisospira*) *strebeli*, Pfeffer (1887) (cf. *anteà*, p. 265), the name of this species must be changed.

CŒLOCENTRUM (p. 267).

Cœlocentrum filicosta (p. 272).

Eucalodium (*Cœlocentrum*) *filicosta,* Pilsbry, Proc. Acad. Phil. 1891, p. 315 [8].

To the locality given, add:—

Hab. [E. Mexico:] hills around Orizaba (*Heilprin* [8]).

12. **Cœlocentrum acanthophorea.**

Cœlocentrum acanthophorea, Dall, Nautilus, xi. p. 62 (1897) [1].

Pale yellow-brown, with 15 whorls remaining, suture with a sharp-edged thread on each side; aperture projecting; small spines like the rays of a star projecting into the lumen of the last whorl.

Long. 30, diam. 7, apert. 4·7 millim.

Hab. Central Mexico: Encarnacion, State of Hidalgo (*E. W. Nelson* [1]).

13. **Cœlocentrum nelsoni.**

Cœlocentrum nelsoni, Dall, Proc. U.S. Nat. Mus. xix. p. 352, t. 33. figg. 5, 6 (1896) [1].

Long. 53, diam. 18 millim.

Hab. S.E. Mexico: Tuxtla (*E. W. Nelson* [1]).

14. **Cœlocentrum pfefferi.**

Cœlocentrum pfefferi, Dall, Proc. U.S. Nat. Mus. xix. p. 352, t. 33. figg. 1, 2 (1896) [1].

Shorter, stouter, and less cylindrical than *C. turris.*

Long. 43, diam. 15 millim.

Hab. S.E. Mexico: Ocozocoautla (Otozucuantla) in Chiapas, 1200 metres (*E. W. Nelson* [1]).

HOLOSPIRA (p. 273).

Dall [Proc. U.S. Nat. Mus. xviii. pp. 3–5 (1895), xix. pp. 346, 347; Nautilus, ix. p. 50 (1895)] subdivides this genus as follows:—

Subgen. Holospira, s. str. Axis with a plait in the penultimate whorl, and with basal, parietal, and peripheral lamellæ projecting into the lumen of that whorl: *H. pilocerei, goldfussi, goniostoma.*

Sect. Bostrichocentrum, Strebel and Pfeffer. Axis moderate, with a continuous plait extending nearly the whole length, but with no lamellæ: *H. tryoni, veracruziana,* n.

Sect. Haplostemma, Dall. Axis moderate, with a short stout axial lamella in the penultimate whorl only: *H. mearnsi,* Dall, from New Mexico.

Sect. Eudistemma, Dall. Penultimate whorl with a short axial and a parietal lamella only; axis moderate: *H. arizonensis.*

Sect. Distomospira, Dall. Penultimate whorl with a short strong axial and a basal lamella; axis moderate, smooth: *H. bilamellata,* Dall, from New Mexico.

Subgen. Metastoma, Strebel and Pfeffer. Axis smooth, without plait or sinuosity; penultimate whorl without lamellæ: *H. rœmeri, pfeifferi, remondi, coahuilensis, semisculpta.*

Subgen. Cœlostemma, Dall. Axis vertically ribbed as in *Cœlocentrum*; shell otherwise as in *Metastoma*: *H. elizabethæ.*

Subgen. HOLOSPIRA, s. str. (p. 273).

See the Monograph of this division by Crosse and Fischer [Journ. de Conch. xl. pp. 256–279, t. 5 (1892)], who, however, exaggerate the differences between *Holospira* and *Epirobia* (cf. *anteà*, p. 283); the gap in the geographical distribution on which they rely is now somewhat completed by *H. teres*, var. *högeana*, *H. berendti*, and *H. veracruziana*.

Holospira tryoni (p. 276).

Holospira tryoni, Crosse & Fischer, Journ. de Conch. xl. p. 267, t. 5. figg. 5, 5 *a* (1892) [12].
Holospira gealei, Crosse & Fischer, loc. cit. p. 271, t. 5. figg. 2, 2 *a* [13].

2 (A). Holospira veracruziana.

Holospira (*Bostrichocentrum*) *veracruziana*, Dall, Proc. U.S. Nat. Mus. xviii. p. 4 (1895) [1]; xix. p. 350 [2].

Closely resembling the enlarged figure of *H. microstoma*, Pfr., but with a shorter apical cone and larger aperture.

Long. 17½ millim. Whorls 17.

Hab. E. MEXICO: Misantla (*Mearns* [1 2]).

3. Holospira elizabethæ.

Holospira elizabethæ, Pilsbry, Proc. Acad. Phil. 1889, p. 89, t. 3. figg. 1–5 [1]; Stearns, Proc. U.S. Nat. Mus. xiii. p. 211 (1890) [2]; Crosse & Fischer, Journ. de Conch. xl. p. 272, t. 5. figg. 6, 6 *a* (1892) [3].
Holospira claviformis, v. Mart. anteà, p. 277, t. 16. figg. 10–16 (1897) [4].

Pilsbry's specimens were from the same locality as mine, and obtained by the same collector; the living animal is figured by him [1], figg. 3, 5.

Dall [Proc. U.S. Nat. Mus. xviii. p. 3 (1895)] has proposed for this species a subgenus *Cœlostemma*, characterized by the axis being vertically ribbed as in *Cœlocentrum*.

Holospira pilocerei (p. 278).

Holospira pilocerei, Crosse & Fischer, Journ. de Conch. xl. p. 265, t. 5. figg. 3, 3 *a*, 4, 4 *a* (1892) [5].

This species is, in Dall's arrangement, taken as the type of the subgenus *Holospira*, s. str., characterized by the axis being provided with a plait in the penultimate whorl and with basal, parietal, and peripheral lamellæ. Crosse and Fischer (*loc. cit.*) also figure a variety of somewhat larger size, figg. 4, 4 *a*, without mentioning a definite locality for it.

Holospira coahuilensis (p. 279).

Holospira coahuilensis, Crosse & Fischer, Journ. de Conch. xl. p. 274, t. 5. figg. 1, 1 *a* (1892) [6].
Holospira semisculpta, Crosse & Fischer, loc. cit. p. 275 [7].

Holospira remondi (p. 279).

Holospira remondi, Crosse & Fischer, Journ. de Conch. xl. p. 262, t. 5. figg. 8, 8 *a* [5].

Holospira teres (p. 279).

Holospira teres, Crosse & Fischer, loc. cit. p. 264, t. 5. figg. 9, 9 *a* (var. *β*) [7].

Holospira pfeifferi (p. 280).

Holospira pfeifferi, Crosse & Fischer, loc. cit. pp. 260, 261, t. 5. figg. 7, 7 *a* (var. minor) [10].

Holospira goniostoma (p. 280).

This species also belongs to *Holospira*, s. str., in Dall's arrangement.

11 (A). **Holospira pilsbryi.**

Holospira (*Metastoma*) *pilsbryi*, Dall, Proc. U.S. Nat. Mus. xviii. p. 4 (1895) [1].

Shell externally almost exactly like that of *H. tryoni*, Pfr., as figured by Crosse and Fischer, but with the axis smooth, without plait or sinuosity.

Long. 13, diam. 4 millim. Whorls 14, among which two are nuclear and the six following increase in diameter.

Hab. CENTRAL MEXICO: Puebla (*Mearns* [1]).

Also stated to occur in Arizona (*Dr. Palmer* [1]).

Holospira apiostoma (p. 283). (Tab. XVII. fig. 4.)

The reference to our figure was accidentally omitted on p. 283.

Holospira speluncæ (p. 284).

Cylindrella speluncæ, Pilsbry, Proc. Acad. Phil. 1891, p. 315, t. 15. figg. 15, 15 *a* [5].

To the locality given, add:—

Hab. YUCATAN: cave at Tabi, Ticul and between Sitilpech and Tunkas (*Heilprin* [5]).

Pilsbry [1] states that the specimens collected at these localities seem to connect this species with *H.* (*Cylindrella*) *morini*.

Var. *dubia*.

Cylindrella speluncæ, var. *dubia*, Pilsbry, loc. cit. p. 316, t. 15. figg. 14, 14 *a* [6].

A more slender form, always truncated and decidedly smaller.

Long. 10, diam. $1\frac{3}{4}$–2 millim. Remaining whorls 12–13.

Hab. YUCATAN: Labna (*Heilprin* [6]).

Holospira morini (p. 285).

The references to our figures of two of the varieties of this species were accidentally omitted on p. 285: var. *pulchella* (Tab. XVII. figg. 3, 3 *a*); var. *salpinx* (Tab. XVII. fig. 5).

CYLINDRELLA (p. 286).

Cylindrella bourguignatiana (p. 286).

Cylindrella bourguignatiana, Pilsbry, Proc. Acad. Phil. 1891, p. 316[2]; Simpson, Nautilus, xi. p. 13 (1897)[3].

Pilsbry thinks that this species is allied to *C. speluncæ*, *C. morini*, and *C. subtilis* (which are here referred to the subgenus *Epirobia* of *Holospira*), although the shell is always truncated, and has the base compressed into an acute carina.

Simpson[3] states that his specimens were found in a prickly thatch-palm grove (*Thrinax radiatus*) on Utila Island, the types described by Ancey[1] having been found by him.

MACROCERAMUS (p. 287).

Macroceramus concisus (p. 287).

Macroceramus concisus, Pilsbry, Proc. Acad. Phil. 1891, p. 316[11].

To the localities given, add :—

Hab. [Yucatan :] Izamal, Merida, Tekanto, Tunkas, between Tunkas and Sitilpech, Ticul, Uxmal, and Santa Ana, near Calcehtok, very abundant (*Heilprin*[11]).

Central Costa Rica : Santa Clara, 2000 metres (*Biolley*, 1895).

Var. *arctispirus*.

Macroceramus gossei, var. *arctispirus*, Ancey, Ann. de Malac. ii. p. 242 (1886)[12]; Pilsbry, loc. cit. p. 316[13].

Hab. Yucatan : Merida, Tekanto, Tunkas, &c. (*Heilprin*[13]).

Honduras : Utila Island (*Simpson*[12 13]).

This is, according to Pilsbry[13], a small form of *M. concisus*, exactly corresponding with the smaller specimens which occur with the typical ones in Yucatan.

Macroceramus kieneri (p. 289).

Macroceramus kieneri, Binney, Bull. Mus. Comp. Zool. xix. p. 202 (with figure) (1890)[4].

OPEAS (p. 291).

Opeas subula (p. 291).

To the localities given, add :—

Hab. E. Costa Rica : Moin Hill, near Limon (*Pittier*).

Opeas micra, var. **caracasense** (p. 294).

Rumina (*Opeas*) *caracasensis*, Pilsbry, Proc. Acad. Phil. 1891, p. 318[18].

To the localities given, add :—

Hab. [S.W. Mexico :] San Carlos, east of Oaxaca (*Höge*).

E. Costa Rica : Moin Hill, near Limon, and Bruschik, Alta Tararia, near Talamanca (*Pittier*).

Pilsbry[18] also records it from Orizaba and Vera Cruz (*Heilprin*[18]).

10. Opeas patzcuarense.

Opeas patzcuarense, Pilsbry, Proc. Acad. Phil. 1899, p. 399 [1].

Minute, slender, slowly tapering, glossy and smooth.
Long. 3, diam. 0·8 millim. Whorls $7\frac{1}{2}$.

Hab. CENTRAL MEXICO: Patzcuaro, State of Michoacan (*Mr. & Mrs. Rhoads* [1]).

11. Opeas odiosum.

Opeas odiosum, Pilsbry, Proc. Acad. Phil. 1899, p. 399 [1].

Slender, turrited, completely imperforate, translucid, glossy, irregularly scored by unequally spaced longitudinal grooves, which are similar in character to those of *Hyalinia indentata.*
Long. 6·9, diam. 2, apert. 1·5 millim. Whorls $8\frac{1}{2}$.

Hab. CENTRAL MEXICO: Patzcuaro (*Mr. & Mrs. Rhoads* [1]).

12. Opeas rhoadsæ.

Opeas rhoadsæ, Pilsbry, Proc. Acad. Phil. 1899, p. 399 [1].

Similar in sculpture and colour to the preceding (*O. odiosum*), also wholly imperforate, but perceptibly more slender in the spire, with smaller apex.
Long. 7, diam. 1·7–1·9, apert. 1·6 millim. Whorls 9–$9\frac{1}{2}$.

Hab. N.E. MEXICO: Diente, near Monterey, State of Nuevo Leon (*Mr. & Mrs. Rhoads* [1]).

SUBULINA (p. 296).

Subulina octona (p. 298).

To the localities given, add:—

Hab. [E. COSTA RICA:] Moin Hill, near Limon (*Pittier*).
[S.W. COSTA RICA:] middle part of the Rio Pacuare del Sur, thermal springs of Djiri-Durunia, 800 metres, and valley of Baia (*Pittier*).

Var. *trochlea* (p. 299).

Rumina (*Subulina*) *trochlea,* Pilsbry, Proc. Acad. Phil. 1891, p. 318 [29].

To the localities given, add:—

Hab. [YUCATAN:] Izamal (*Heilprin* [29]).

Pilsbry agrees with me in treating *S. trochlea* as a variety of *S. octona.*

PSEUDOSUBULINA (p. 301).

Pseudosubulina berendti (p. 301).

Var. *occidentalis.*

Pseudosubulina berendti, var. *occidentalis,* Pilsbry, Proc. Acad. Phil. 1899, p. 398 [6].

Distinguished by the weaker, less crowded rib-striæ and wider aperture.
Long. 12·7–15, diam. 2·8–3·2, apert. 2·8–3 millim. Whorls $11\frac{1}{2}$–12.

Hab. W. MEXICO: Uruapam, State of Michoacan (*Mr. & Mrs. Rhoads* [6]).

1 (A). **Pseudosubulina texoloensis.**

Pseudosubulina texoloensis, Pilsbry, Proc. Acad. Phil. 1899, p. 398 [1].

"The shortness of the whorls and the contraction of the upper part of the spire are the more prominent features of this species. The columella is much more strongly truncated than in *P. berendti*.
"Long. 9·2, diam. 2·5, apert. 2 millim." Whorls $10\frac{1}{2}$.

Hab. E. MEXICO: Salto de Texolo, State of Vera Cruz (*Mr. & Mrs. Rhoads* [1]).

SPIRAXIS (p. 305).

Spiraxis miradorensis (p. 309).

Pseudosubulina (*Volutaxis*) *miradorensis*, Pilsbry, Proc. Acad. Phil. 1891, p. 312 [2].

To the locality given, add:—

Hab. [E. MEXICO:] Orizaba (*Heilprin* [2]).

Spiraxis similaris (p. 310).

Volutaxis similaris, Pilsbry, Nautilus, x. p. 59 (1896) [2].

To the locality given, add:—

Hab. [E. MEXICO:] San Rafael, Jicaltepec (*Townsend* [2]).

15. **Spiraxis uruapamensis.**

Spiraxis uruapamensis, Pilsbry, Proc. Acad. Phil. 1899, p. 398 [1].

More obtuse than *S. sulciferus*, whorls more convex than in *S. tenuecostatus*.
Long. 5·2, diam. 2 millim.

Hab. W. MEXICO: Uruapam, State of Michoacan (*Mr. & Mrs. Rhoads* [1]).

LEPTINARIA (p. 312).

Biolley [Mol. terr. y fluv. de Costa Rica, p. 16], who incorrectly gives the name of this genus as *Leptinotarsa* *, mentions three species from Costa Rica, without naming them, found in moss and at the foot of trees.

Leptinaria pittieri (p. 317).

To the localities given, add:—

Hab. [E. COSTA RICA:] Bruschik, Alta Tararia, near Talamanca, 250 metres (*Pittier*, Sept. 1898).

Leptinaria crenulata (p. 318).

To the locality given, add:—

Hab. N.E. COSTA RICA: La Paz, on the road to the Rio Sarapiqui (*Biolley*, Dec. 1892).

Leptinaria costaricana (p. 320).

To the localities given add:—

Hab. E. COSTA RICA: Bruschik, Alta Tararia, near Talamanca (*Pittier*, Sept. 1898).

* A genus of Phytophagous Coleoptera.

TORNATELLINA (p. 323).

[2. **Tornatellina pittieri.** (Tab. XLIV. fig. 10.)

Tornatellina pittieri, v. Mart. Sitzungsb. Ges. nat. Freunde in Berlin, 1898, p. 157 [1].

Testa sinistrorsa, imperforata, conoideo-turrita, solida, lævigata, nitida, albido-cornea; spira elongata, apice obtusiusculo, sutura impressa, simplice; anfr. $6\frac{1}{2}$, convexiusculi, ultimus basi rotundatus; apertura $\frac{1}{3}$ longitudinis vix superans, sat obliqua, lanceolata, margine externo leviter arcuato, tenui, antrorsum convexo, marg. basali anguste rotundato, marg. columellari valde arcuato, basi perdistincte oblique truncato, pariete aperturali plica valida intrante compressa munito.

Long. $9\frac{1}{2}$, diam. 4; apert. long. obliqua $3\frac{1}{2}$, diam. 2 millim.

Hab. Cocos Island: in the Pacific, about halfway between the west coast of Costa Rica and the Galapagos Islands (*Pittier* [1]).

Although this locality is not really included within the scope of the present work, I have thought it worth while to mention this and the following species, the genus being represented on the S.W. coast of Nicaragua and the island belonging politically to Costa Rica.]

[3. **Tornatellina martensi.**

Leptinaria (*Neosubulina*) *martensi*, Dall, Proc. Acad. Phil. 1900, p. 97, t. 8, fig. 10 [1].

Dextral, of yellowish-green colour, polished, with strong parietal fold.
Long. 10, diam. 4, apert. $4\frac{1}{4}$ millim.

Hab. Cocos Island: under stones (*Heller & Snodgrass* [1]).

The presence of this species adds to the Polynesian character of the fauna of Cocos Island, which I have hinted at in my paper quoted above.]

ORYZOSOMA (to follow the genus *Cæcilianella*, p. 324).

Streptostyla, subgen. *Orizosoma*, Pilsbry, Nautilus, iv. p. 9 (May 1891).
Streptostyla, subgen. *Oryzosoma*, Pilsbry, Proc. Acad. Phil. 1891, p. 311.

Shell perforated; the columella thickened, simply concave, almost imperceptibly sinuous above.

1. **Oryzosoma tabiense.**

Streptostyla (*Orizosoma*) *tabiense*, Pilsbry, Nautilus, iv. p. 9 [1].
Streptostyla (*Oryzosoma*) *tabiense*, Pilsbry, Proc. Acad. Phil. 1891, p. 311, t. 15. figg. 6, 7 [2].

Long. 9·8, diam. 4·8; apert. long. 4·8, diam. 2·5 millim. Whorls 6.

Hab. Yucatan: in a cave in the mountains, near the Hacienda of Tabi; dead specimens only known, denuded of epidermis (*Heilprin* [1 2]).

PUPA (p. 325).

[3 (a). **Pupa cocosensis.**

Vertigo cocosensis, Dall, Proc. Acad. Phil. 1900, p. 98, t. 8. fig. 13 [1].

Broadly ovate, reddish-brown, of silky appearance, minutely punctate; one columellar, two parietal, and two small palatal folds.

Length 2·1, diam. $1\frac{1}{2}$, apert. $\frac{4}{5}$ millim.

Hab. Cocos Island: on leaves (*Heller & Snodgrass*, 1899 [1]).]

6. Pupa prototypus.

Bifidaria prototypus, Pilsbry, Proc. Acad. Phil. 1899, p. 400 [1].

In general appearance like *P. rupicola*, Say, but with only two denticles inside the outer lip, none at the base of the columella; parietal fold composed of two laminæ, which are connected by a callus, the right one more emerging, the left deeply entering.

Long. $2\frac{1}{2}$, diam. 1 millim.

Hab. W. Mexico: Huango (Huingo), State of Michoacan (*Mr. & Mrs. Rhoads* [1]).

N.B.—*Pupa gabbi*, var *mexicanorum*, Cockerell, Nautilus, x. p. 143 (1897), does not come within the limits of this work: it was found in the rejectamenta of the Rio Grande del Norte, near Mesilla, New Mexico.

SUCCINEA (p. 330).

Succinea luteola (p. 331).

To the localities given, add:—

Hab. N. Central Mexico: Lake Palomas, in the Mimbres Valley, State of Chihuahua, sparingly [*International Boundary Commission*: see Dall, Proc. U.S. Nat. Mus. xix. p. 365 (1896)].

Also in the drift of the Rio Santa Cruz, a tributary of Rio Gila, at Tucson, Arizona (*fide Dall*).

Succinea guatemalensis (p. 337).

Succinea guatemalensis, Pilsbry, Nautilus, xiii. 19, p. 139 (1900) [5].

To the localities given, add:—

Hab. S.E. Mexico: Tabasco (*Rovirosa* [5]).

Succinea costaricana (p. 338).

To the localities given, add:—

Hab. E. Costa Rica: Bruschik, Alta Tararia (*Pittier*).

[14. Succinea globispira. (Tab. XLIV. fig. 12.)

Succinea globospira, v. Mart. Sitzungsb. Ges. nat. Freunde in Berlin, 1898, p. 158 [1]; Dall, Proc. Acad. Phil. 1900, p. 99 [2].

Testa ovata, rugoso-striata, succinea; anfr. $2\frac{1}{2}$, rapide crescentes, priores $1\frac{1}{2}$ spiram obtusam globosam formantes, ultimus oblongus, subcompressus, sutura valde obliqua, impressa; apertura ampla, $\frac{4}{5}$ longitudinis occupans, ovata, superne modice acutangula, margine externo superne valde, inferne minus arcuato, basali late rotundato, columellari stricto, vix arcuato, pertenui.

Long. 8, diam. $4\frac{1}{2}$; apert. long. obliqua $6\frac{1}{2}$, diam. 4 millim.

Hab. Cocos Island (*Pittier* [1], *Heller & Snodgrass* [2]).

Allied to *S. crocata* and *S. modesta*, A. Gould, from the Samoa and Tonga Islands.]

15. **Succinea tlalpamensis.**

Succinea tlalpamensis, Pilsbry, Proc. Acad. Phil. 1899, p. 401 [1].

Allied to *S. retusa*, Lea, and *S. salleana*, Pfr.; aperture decidedly larger than in the former, and spire longer and more slender than in the latter.

Long. 14½–15, diam. 8–8½, apert. 11·8–12 millim.

Hab. CENTRAL MEXICO: Tlalpam (*Mr. & Mrs. Rhoads* [1]).

Var. *cuitseana.*

Succinea tlalpamensis, var. *cuitseana*, Pilsbry, loc. cit. p. 401 [2].

A smaller form.

Long. 9·6–10·8 millim.

Hab. CENTRAL MEXICO: Lake Cuitseo, near Huango, State of Michoacan (*Mr. & Mrs. Rhoads* [2]).

XANTHONYX and CRYPTOSTRACON (pp. 343, 344).

Notes on the anatomy and affinities of these two genera are given by Pilsbry and Vanatta (Proc. Acad. Phil. 1898, pp. 229, 230), and Pilsbry (Proc. Malac. Soc. Lond. iv. pp. 27–30, t. 3. figg. 12–15).

METOSTRACON.

Metostracon, Pilsbry, Proc. Malac. Soc. Lond. iv. p. 24 (March 1900).

This new genus is described as slug-like, with the shell flat, spiral, and covered by the mantle.

1. **Metostracon mima.**

Metostracon mima, Pilsbry, loc. cit. p. 27, t. 3. figg. 1–11 [1].

Hab. CENTRAL MEXICO: Morelia and Uruapam, State of Michoacan (*Rhoads* [1]).

CARYCHIUM (p. 352).

Carychium exiguum, var. **mexicanum** (p. 352).

To the localities given, add:—

Hab. [E. MEXICO:] San Juan Miahuatlan, State of Vera Cruz, found within *Eucalodium cereum* (*coll. Strebel, in Mus. Hamburg.*).

PHYSA (p. 353).

Physa aurantia (p. 356).

Pilsbry (Nautilus, xiii. p. 139) mentions this species as found by Prof. Rovirosa at Macajuca, apparently in Tabasco. Perhaps it was *P. impluviata*?

Physa impluviata (p. 358).

Physa aurantia (part.), Biolley, Mol. terr. y fluv. de Costa Rica, p. 17 [12].

To the localities given, add:—

Hab. Central Costa Rica: Virilla, Torres, Maria Aguilar, and Tiribi, in all rivers and streams, and during the rainy season in ponds near them (*Biolley* [12]); La Uruca, near San José, in an irrigation stream ("rigole") running through muddy ground, 1100 metres (*Biolley*).

Physa fuliginea (p. 360).

To the localities given, add:—

Hab. Central Costa Rica: Rio Torres, near San José, on stones, in a strong current (*Biolley*); Pila de Los Angelos, Cartago, 1400 metres (*Biolley*: typical form and var. *pliculosa*).

Physa spiculata (p. 366).

To the localities given, add:—

Hab. S.W. Costa Rica: Diquis, below Terraba, 100 metres (*Pittier*).

Var. *tapanensis* (p. 367).

Aplexa tapanensis, Pilsbry, Nautilus, xiii. p. 139 [10].

Hab. S.E. Mexico: San Juan Bautista in Tabasco (*Rovirosa* [10]).

Central Costa Rica: La Uruca, near San José, in an irrigation stream running through muddy ground, 1100 metres (*Biolley*).

Physa osculans (p. 370).

According to Stearns [Proc. U.S. Nat. Mus. xiv. p. 104 (1891)], the typical form of this species occurs as far north as the United States bank of the Rio Grande; it therefore probably inhabits N.E. Mexico.

Var. *mexicana* (p. 370).

To the localities given, add:—

Hab. [N. Central Mexico:] Lake Palomas, in the Mimbres Valley, State of Chihuahua [*International Boundary Commission*: see Dall, Proc. U.S. Nat. Mus. xix. p. 369 (1896)]. Also found at various places in New Mexico, Arizona, and California, according to Dall (*loc. cit.*).

Var. *rhyssa*.

***Physa osculans*, var. *rhyssa*, Pilsbry, Proc. Acad. Phil. 1899, p. 401** [22].

Smaller than typical *osculans*, with numerous slight longitudinal folds on the last whorl.

Hab. N.E. Mexico: Saltillo, State of Coahuila (*Mr. & Mrs. Rhoads* [22]).

N. Central Mexico: Lake Palomas, in the Mimbres Valley [*International Boundary Commission*: see Dall, Proc. U.S. Nat. Mus. xix. p. 368 (1896)].

LIMNÆA (p. 376).

The genus *Limnæa* is also found in Costa Rica, P. Biolley having sent me a specimen from Rio Torres, near San José, but I dare not venture to determine the species.

PLANORBIS (p. 380).

Planorbis tumens (p. 387).

Stearns [Proc. U.S. Nat. Mus. 1891, p. 102] has recorded this species from Phœnix, Arizona, at the Rio Gila, which flows into the Gulf of California.

Planorbis caribæus (p. 387).

Planorbis tumidus (Pfr.), Dall, Proc. U.S. Nat. Mus. xix. p. 369 (1896) [16a].

To the localities given, add :—

Hab. [N. Mexico :] San Bernardino and Rio Sonoyta, near the boundary-line (*International Boundary Commission*[16a]).

Planorbis orbiculus (p. 390).

Also occurs in the Devil's River, Texas (*W. Lloyd*), according to Stearns (*loc. cit.*).

Planorbis parvus (p. 394).

Stearns [Proc. U.S. Nat. Mus. 1891, p. 104] records this species from Arizona and the Colorado desert, these localities to some extent bridging over the gap in the known distribution of *P. parvus*.

Planorbis obstructus (p. 398).

Planorbis obstructus, Pilsbry, Nautilus, xiii. p. 139 (1900) [9].

To the localities given, add :—

Hab. S.E. Mexico : margin of the Rio Grijalva (*Rovirosa*[9]).

AMPULLARIA (p. 404).

Ampullaria costaricana (p. 418).

To the localities given, add :—

Hab. [S.W. Costa Rica :] Rio Coto and wooded swamps between Lapa and Rio Las Esquinas, Golfo Dulce (*Pittier*).

Ampullaria hondurasensis (p. 420).

Observations on the living animal and the eggs of this species are given by Tate in the work already cited [2].

Add to the species of *Ampullaria* erroneously accredited to Mexico (p. 424) :—

Ampullaria pallens, Philippi (in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, *Ampullaria*, p. 52, t. 8. fig. 4) : labelled at one time as Mexican in the Berlin Museum ; the specimen was obtained, indeed, by F. Deppe, though not in Mexico, but during his subsequent visit to the Philippines [see v. Martens, Malak. Blätt. iv. p. 184 (1858), and xii. p. 53 (1865)]. Philippi correctly surmised that it was from the East Indies.

AMNICOLA (p. 430).

4 (A). **Amnicola (?) vulcani,** sp. n. (Tab. XLIV. fig. 13.)

Testa conoideo-oblonga, vix rimata, nitidula, fusca; anfr. $5\frac{1}{2}$, convexiusculis, sutura superficiali; apertura ovata, $\frac{2}{5}$ longitudinis testæ æquante, margine externo tenui, columellari arcuato, crassiusculo.
Long. 5, diam. $2\frac{1}{3}$, apert. long. 2 millim.

Hab. W. GUATEMALA: Lake of Atitlan (*Bernoulli*, 1869: given by Dr. O. Stoll).

It may be added that the locality for this species, the Lake of Atitlan, is bordered on the south side by three volcanoes, and has no drainage to the Pacific.

4 (B). **Amnicola stolli,** sp. n. (Tab. XLIV. fig. 14.)

Testa conoidea, ventricosa, perforata, nitidula, pallide fusca; anfr. 4, valde convexis, sutura profunda; apertura ovata, $\frac{4}{9}$ longitudinis testæ occupante, margine externo tenui, columellari subincrassato, modice arcuato.
Long. 3, diam. 2, apert. long. $1\frac{1}{3}$ millim.

Hab. W. GUATEMALA: in wells of the town of Antigua (*Stoll*).

Amnicola palomaensis (p. 434).

Bythinella palomaensis, Dall, Proc. U.S. Nat. Mus. xix. p. 369, t. 31. fig. 9 (1896) [2].

Amnicola costaricensis (p. 435).

To the localities given, add:—

Hab. E. COSTA RICA: small streams between Madre de Dios and Rio Hondo, 80 metres (*Pittier*).

[CENTRAL COSTA RICA:] Cartago (*Stoll*).

PACHYCHILUS (p. 437).

Pachychilus glaphyrus (p. 438).

h. Var. *pyramidalis* (p. 445).

To the localities given, add:—

Hab. CENTRAL NICARAGUA: Lake of Managua (*Rothschuh, in Mus. Berol.*).

j. Var. *bicarinatus*.

Pachychilus glaphyrus, var., Pilsbry, Proc. Acad. Phil. 1892, p. 339, t. 14. fig. 6 [37].

Two interrupted keels on the last two whorls, the upper one in the sutural line, three in the preceding whorls; vertical plaits vanishing already in the upper whorls; base of the last smooth.
Long. 75, diam. 20, apert. long. 16 millim.

Hab. S.E. MEXICO: State of Tabasco (*Rovirosa* [37]).

This form agrees with the var. *potamarchus* in the want of spiral ridges at the base of the last whorl, and seems to indicate a peculiar series recognizable by the above mentioned characters, both varieties being known only from Tabasco.

Pachychilus largillierti (p. 450). (Tab. XLIV. fig. 17.)

I give here the figure of a living specimen from the Lake of Amatitlan, drawn by Dr. O. Stoll.

Pachychilus chrysalis (p. 457).

To the localities given, add :—

Hab. CENTRAL NICARAGUA: Lake of Managua (*Rothschuh, in Mus. Berol.*).

Pilsbry (Nautilus, xiii. p. 139) enumerates *P. vulneratus*, Crosse & Fisch., as a distinct species, found by Prof. Rovirosa in the Upper Puyacatengo River, near Teapa (S.E. Mexico); but he gives no other distinctive characters than a very widely extended erosion, leaving less than two whorls remaining.

Pachychilus graphium (p. 461).

To the localities given, add:—

Hab. YUCATAN (*Godman*, Febr. 1888).

Pachychilus pilsbryi (p. 463). (Tab. XLIV. fig. 8.)

Pachychilus (*Potamanax*) *rovirosai*, Fischer & Crosse, Miss. Scient. Mex., Moll. ii. p. 668, t. 71. fig. 12[2] (apparently copied from Pilsbry[1]).

To the locality given, add:—

Hab. [S.E. MEXICO:] Santa Gertrudis in Tabasco, at the Usumacinta River, amongst gravel on the dry bank of the river (*Berendt, in Mus. Hamburg.*).

Dr. Berendt's specimen, here figured, is of somewhat more slender form than Pilsbry's type, measuring 17 millim. in length, diam. 10, aperture 7 in length and $6\frac{1}{2}$ in breadth, including the columellar margin. It has nine distinctly prominent, brownish-black, spiral ridges on the last whorl, and five on the visible part of the penultimate whorl, these contrasting in colour with the pale grey interstices, the upper two on each whorl being slightly nodulose; between the second and third ridges a much narrower, pale reddish one is intercalated, and there is a similar one at the base below the ninth. Pilsbry[1] states that the spiral liræ are somewhat alternating in size. It is to be regretted that the operculum is still unknown. The broad columellar margin, the rounded basal margin of the aperture, the spiral sculpture, and the solidity of the shell give *P. pilsbryi* the general aspect of a species of the submarine genus *Littorina*.

SEMISINUS (p. 464).

2. **Semisinus maculatus.** (*Hemisinus maculatus*, Tab. XLIV. fig. 7.)

Melanopsis maculata, Lea, Trans. Am. Phil. Soc. v. (=Obs. Unionid. i.) p. 194, t. 19. fig. 75 (1832)[1].

Melania osculatii, Ant. Villa, Notizie intorno al genere *Melania*, in Atti dell' Accad. fisico-medico-statistica di Milano, no. 2, p. 8 (1855)[2].

Hemisinus osculatii, Reeve, Conch. Icon. xii., *Hemisinus*, t. 3. fig. 10 (1860)[3]; Brot, in Martini & Chemnitz, Syst. Conch.-Cab. ed. 2, Melaniaceen, p. 379, t. 8. figg. 7 and 8, 8 *a*, *b*[4].

Hemisinus binneyi, Tryon, Am. Journ. of Conch. ii. p. 8, t. 2. fig. 8[5].

Shell ovato-oblong, truncated above, moderately attenuated below, smooth, greenish-brown, with spiral rows of darker brown square spots, in about 10 spiral rows on the last whorl, the upper ones by pairs nearer

one to the other, only 3 on the visible part of the penultimate whorl; 3 remaining whorls. Aperture narrowly ovate or lanceolate; outer margin thin, little arcuated, basal margin narrowly rounded, columellar margin nearly straight, a little thickened, of a violaceous hue, obliquely notched below. Long. 14, diam. 8; apert. long. 8, diam. $4\frac{3}{4}$ millim. (Costa Rican specimen).

Hab. N.E. Costa Rica: confluence of the Rio Shei and of the Rio Tararia (*Pittier*, Sept. 1898).

Colombia [5]: Justos, in the Rio Dagua (*Höpke, in Mus. Berol.*).

Ecuador: Quito (*Osculati* [2]).

The localities "Peru (*Lieut. Humphreys* [1])" and "Brazil" [3] are too vague to be of any value.

NERITINA (p. 465).

Neritina latissima, var. **globosa.**

To the localities given, add:—

Hab. Salvador: La Libertad (*Aurel Krause*, 1882, *in Mus. Berol.*).

[S.W. Costa Rica:] El Pozo, Rio Grande de Terraba, 700 metres (*Pittier*).

Neritina lineolata (p. 471).

Neritina lineolata, Ancey, Ann. de Malac. ii. p. 256 (1886) [33].

To the localities given, add:—

Hab. E. Honduras: mouth of the Rio San Estevan (St. Stephen), in fresh water (*Ancey* [33]).

Ancey [33] also mentions *N. microstoma*, Lam., as living at the same locality; this is probably the var. *reclivata*, Say, of the present species (*anteà*, p. 472), which is found in other places in company with typical *N. lineolata*, although Ancey still separates *N. microstoma* from *N. reclivata*.

UNIO (p. 478).

Almost simultaneously with the issue of the concluding portion of my contribution on the Unionidæ, a very valuable "Synopsis of the Najades or Pearly Freshwater Mussels," by Ch. T. Simpson, has been published [Proc. U.S. Nat. Mus. xxii. pp. 501–1044 (Smithson. Institut. no. 1205)]. In this work the species are arranged according to the sexual peculiarities visible in the shell and the position of the ovisacs within the outer or inner gills; these characters are only known in the European, North-American, and some South-American species, the other forms having to be intercalated according to the sculpture of the summits, or, in cases where this could not be ascertained, by the general resemblance of the shell to that of better-known species. Numerous genera are distinguished, but a considerable number of species are left under the old name *Unio*. The arrangement, of course, differs in many

points from mine, in which I merely endeavoured to unite the more nearly allied species into groups or subgenera according to the characters of the adult shell, in order to facilitate their determination. As regards the subgenera, the following points must be noticed :—

All the Mexican and Central-American species of *Unio*, with the North-American and European (Palæarctic) forms, are placed by Simpson in his subfamily Unioninæ, characterized by the concentric sculpture of the summits and the position of the embryos in the outer gills; none, on the contrary, in the subfamily Hyrianæ, with radial or zigzag-radial sculpture of the summits and the embryos in the inner gills only, comprising South-American, African (Ethiopian), East Indian, and Australian species.

Crenodonta (pp. 479, 492).

Simpson admits *Crenodonta* as a section of his genus *Quadrula*, division Tetragenæ.

Psoronaias (pp. 480, 493).

Simpson places most of the species of *Psoronaias* in the genus *Unio*, section *Elliptio*, Raf., division Homogenæ; *U. ostreatus* and *U. percompressus*, however, are included by him in *Quadrula*, section *Rotundaria*. *U. granosus*, Brug., from Cayenne, is referred to the subfamily Hyrianæ, genus *Diplodon* (*loc. cit.* p. 878), because it is South-American. Unfortunately, I have not a specimen of *U. granosus* before me for comparison, but in the nearly allied *U. coriaceus*, Dunker (Zeitschr. für Malak. 1848, p. 181), from Rio Janeiro, the sculpture of the summits is very like that of the Mexican *U. semigranosus* (see Tab. XXX. fig. 1). It is true that in the Mexican species the oblique rows of granular elevations run chiefly in the direction from behind and above to before and below; in the Brazilian form they run in this direction in the hinder part of the summits only, and in the fore part from before and above to behind and below, which produces a convergence of the rows, as in *Hyria corrugata*. This may prove to be a reliable distinctive mark between the Mexican and the South-American Unionidæ with granulated sculpture? If so, *Psoronaias* is no exception to the rule that the Mexican and Central-American forms of the old genus *Unio* are completely separated from the South-American ones.

Unio crocodilorum (p. 495).

Var. *rudis*.

Quadrula rudis, Simpson, Proc. Acad. Phil. 1900, p. 82, t. 3. fig. 2 [4].

Long. 103, alt. 65, diam. 45 millim. Summits in $\frac{1}{4}$ of the length.

Hab. Guatemala: Rio Taxtunilha (*Wheatley* [4]).

There is already a *Unio rudus*, Lea, but *rudis* ("raw") and *rudus* ("lump") have a different meaning in Latin.

Quadrula guatemalensis, of the same author (*loc. cit.* p. 83, t. 2. fig. 4), from the Rio Usumacinta, is founded on a young specimen of this or of a nearly allied species.

AROTONAIAS (pp. 480, 497).

This subgenus, comprising chiefly Nicaraguan species, coincides with *Ptychoderma*, section *Plagiola*, in Simpson's arrangement (*loc. cit.* p. 606). The sheet of the present work (**60**) in which *Arotonaias* was characterized (*anteà*, p. 480) was published in February 1900, and my name almost certainly has priority. For *U. aratus* and *U. granadensis*, however, he proposes a distinct section, *Micronaias*, within the genus *Unio* (*loc. cit.* pp. 743, 744), and *U. caldwelli* and *U. averyi* are placed by him in the genus *Nephronaias* (*loc. cit.* p. 593).

17 (A). **Unio reticulatus.**

Nephronaias reticulata, Simpson, Proc. Acad. Phil. 1900, p. 77, t. 2. fig. 3 [1].

Elliptical, slightly triangulate behind, with radiating ridges or slight furrows, which cut the concentric sulcations into loops, and give the shell a reticulated appearance; outside tawny.

Long. 50, alt. 33, diam. 20 millim. Summits in $\frac{2}{5}$ of the length.

Hab. HONDURAS: Patook River [1].

Simpson (*loc. cit.* pp. 594, 595) makes this species the type of a separate group of the genus *Nephronaias*, and places it between that of *N. macnieli* and that of *N. scamnata*; these latter were included by me in *Simonaias*.

PLEUROBEMA (pp. 480, 500).

The three species included under this subgeneric name are placed by Simpson in the genus *Quadrula*, division Tetragenæ, and not in that of *Pleurobema*, Raf., type *U. clava*, Lam., division Homogenæ.

SPHENONAIAS (pp. 480, 500); NEPHRONAIAS (pp. 480, 502); SIMONAIAS (pp. 480, 505).

The species enumerated under these three subgenera are distributed by Simpson in quite a different manner between two genera—*Unio*, in the restricted sense, division Homogenæ, and *Nephronaias*, division Heterogenæ. *U. aztecorum* is even placed in *Lampsilis*, apart from *U. plicatulus*, Charp., Küst. (*Nephronaias*), with which I believe it is identical.

Unio acutirostris (p. 501).

On account of the vague indication of locality "South America," *U. acutirostris*, Lea, is associated by Simpson (*loc. cit.* p. 885) with other South-American species in the genus *Diplodon*, far apart from *U. sphenorhynchus*, Crosse & Fisch., with which I suspect it to be identical. It is true that I have not seen a specimen determined by Lea.

Unio aztecorum, var. **strebeli** (p. 503).

According to Simpson (*loc. cit.* p. 592, nota), the type of *U. strebeli*, Lea (in the U.S. Nat. Museum), is, without doubt, a young specimen of *U. medellinus*. I am unable to reconcile this with the fact that the figure which Lea himself gives of his *U. strebeli* (Obs. Unionidæ, xii. t. 51. fig. 131) is of considerably larger size than that of his *U. medellinus* (Obs. Unionidæ, ii. t. 12. fig. 34): the former measures 74 millim. long, 41 high, and 26 in diameter, the latter 57 long, 35 high, and 18 in diameter. Specimens labelled *U. strebeli* in Strebel's own collection, now in the Hamburg Museum, are still larger, as I have already stated (*anteà*, p. 503). As a rule, young examples of these bivalves are comparatively more compressed than old ones of the same species; but, according to the figures given by Lea, in *U. strebeli* the transverse diameter is considerably more than half the height (26 : 41), in *U. medellinus* about half the height (18 : 35). The shell described and figured by Lea as *U. strebeli* cannot, therefore, be a young specimen of *U. medellinus*.

Unio popei (p. 504).

Unio popei, Simpson, Proc. U.S. Nat. Mus. xix. p. 371 (1896) [7].

Again found in both the original localities, Rio Salado, Nuevo Leon, Mexico, and Devil's River, Texas, by the Biological Expedition of the U.S. Department of Agriculture; also in Kinney County, Texas, by Dr. Mearns [7].

Unio cuprinus (p. 505).

Simpson (*loc. cit.*) distributes under three genera the forms which I have treated as varieties of *U. cuprinus*: *U. cuprinus* and *U. metallicus* as one and the same species, under *Lampsilis* (p. 572); *U. persulcatus*, *U. calamitarum*, and *U. tabascoensis* under *Nephronaias* (p. 596); and *U. coloratus* under *Unio*, section *Elliptio* (p. 700). If I am not utterly misled in my determinations by the specimens in the Berlin Museum, labelled by Dunker, Albers, and others, all these forms run one into the other, and belong to one species, which is rather variable in outlines, but constant in the sculpture and coloration. Simpson's spelling "*calimatarum*" is without meaning: Morelet wrote "*calamitarum*," derived from *calamita*, a name given to a sort of frog or toad by different authors, or from *calamus* (calamites), reed-grass (he has also called an *Anodonta*, "*bambousearum*"). According to Simpson's bibliographical researches, the first-published specific name is *metallicus*, Say, preceding Lea's *cuprinus* by more than six months; both are equally descriptive of the species in question *.

* In 1869 a Committee of the conchological section of the Academy of Natural Sciences of Philadelphia recommended that the date of the reading of Lea's papers before the Academy should be taken as the date of publication (Am. Journ. of Conchology, v. p. 34); according to this rule, the name *U. cuprinus* would be preferable.

LAMPSILIS (pp. 480, 509).

A certain number of the species here enumerated under this subgenus are also admitted in the genus *Lampsilis* (division Heterogenæ) by Simpson. *U. discus*, Lea, which I regard as the Mexican analogue of the type of *Lampsilis* (*U. ovatus*, Say), is placed by him in the genus *Unio* (Homogenæ), section *Elliptio*, Raf.; *U. sapotalensis*, Lea, in *Nephronaias*; and *U. cognatus*, Lea, in *Plagiola*, section *Amygdalopsis*, the type of which is *U. donaciformis*, Lea.

Unio discus, var. **panucoensis** (p. 510).

Simpson (*loc. cit.*) makes a section, *Lapidosus*, within the genus *Unio* for *U. lapidosus*, Villa, evidently under the impression that it is a circum-Mediterranean form. Having compared Villa's type in the Berlin Museum with Mexican specimens, I feel sure that it belongs to the same species, and that the pretended locality "Euphrates River" is erroneous.

Unio tampicoensis (p. 511).

The habitat Rio Pecos, Texas, is confirmed by Stearns (Proc. U.S. Nat. Mus. xiv. p. 104).

39 (A). **Unio rovirosai.**

Unio (*Lampsilis*) *rovirosai*, Pilsbry, Nautilus, xiii. 12, p. 140[1].

"Differing from *U. umbrosus* [a var. of *U. tampicoensis*] in the narrower anterior end and consequently triangularly oblong form, the hinge-line and basal margin converging strongly forward; the lateral teeth also shorter. Length 111, height 71, diam. 43 millim. The female is much more swollen posteriorly than in *U. umbrosus*."

Hab. S.E. MEXICO: Laguna de Arasta, near San Juan Bautista (*Rovirosa* [1]).

Not figured. To be compared with *U. alienigenus*.

ELLIPTIO (pp. 481, 514).

The greater part of the species enumerated under this subgenus are also admitted by Simpson in the section *Elliptio* (Raf.), type *crassidens*, Lam., of the genus *Unio*; but *U. ravistellus*, *U. vellicatus*, *U. medellinus*, *U. æruginosus*, and *U. rowelli* are placed by him in *Nephronaias*.

Unio pliciferus (p. 514).

I am glad to state that Simpson agrees with me in uniting *U. pliciferus*, Lea, *U. carbonarius*, Lea, and *U. plexus*, Conr., under one species; but, as a result of his bibliographical researches, he prefers the name *U. plexus* for the whole, Conrad's description having one month's priority.

Unio guatemalanus (p. 519).

This species somewhat resembles *U. melleus*, Lea (Obs. Unionidæ, vii. p. 68, t. 38. fig. 129), from an unknown locality; but, according to Simpson (*loc. cit.* p. 597), no doubt from "Mexico or Central America." On comparing my specimens with Lea's description and figure, I find that *U. melleus* is somewhat less high, more pointed at its hinder end, and has distinct waved wrinkles near the summits; whereas in my examples of *U. guatemalanus* the summits are not worn to a larger extent than shown in Lea's figure, and no wrinkles are visible. At all events, the two species appear to be nearly allied, and this corroborates Simpson's observation on the habitat of *U. melleus*.

Unio manubius (p. 519).

Simpson (*loc. cit.*) considers this form to be a variety of the North-American *U. tetralasmus*.

Unio explicatus (p. 520).

Simpson (*loc. cit.* p. 571) regards *U. testudineus* of Reeve's 'Conchologia Iconica' (nec Morelet) as distinct from *U. explicatus*, Morelet, and names it *U. lividus*; it is said to be also from the Rio Usumacinta. Both *U. explicatus* and *U. lividus* are placed by him in the genus *Lampsilis*.

METAPTERA (pp. 481, 520).

The three species enumerated under this subgenus are placed by Simpson in the genus *Lampsilis*, as well as *U. alatus*, Say, the type of *Metaptera*, Rafinesque.

Unio tamaulipanus (p. 521).

I cannot find any mention of this species (described by Conrad in 1855) in Simpson's work.

Unio mitchelli (p. 522).

Unio mitchelli, Simpson, Proc. U.S. Nat. Mus. xix. p. 371, t. 32. figg. 1–3 (1896) [2].

This species is placed by Simpson in the genus *Unio*, s. str., division Homogenæ, far apart from *U. rowelli* and *U. scamnatus*, which belong in his arrangement to *Nephronaias*, division Heterogenæ; he thinks that *U. mitchelli* is allied to *U. pigerrimus* and may be nothing more than a variety of it.

Unio saladoensis (p. 522).

A distinct species belonging to the genus *Lampsilis*, constituting even a peculiar group, according to Simpson (*loc. cit.* p. 569).

Unio rugosulcatus (p. 522).

This species is credited to "Central America" by Simpson (*loc. cit.* p. 794), without hesitation, but also without more precise information concerning the locality; he places it in the section *Pachynaias*, Crosse, of the genus *Quadrula*, near *U. spheniopsis*, Morelet.

Unio metallicus (p. 522).

See *anteà*, pp. 505 (under *U. cuprinus*), 650.

Unio callosus (to follow *U. metallicus*, p. 523).

Unio callosus, Lea, Trans. Am. Phil. Soc. ii. p. 31 (1841)[1]; Obs. Unionidæ, iii. p. 77, t. 23. fig. 54[2].

Lea[1 2] states that this species was obtained from the Ohio Canal, below Columbus; but Simpson (*loc. cit.* p. 701) says "I am sure that the locality is wrong and it appears to be a Mexican form." If so, I should place *U. callosus* near *U. cuprinus*.

ANODONTA (p. 523).

Simpson (*loc. cit.*), following a hint given by H. v. Ihering, distributes the Unionidæ with toothless hinge, hitherto usually called *Anodonta*, under two genera, widely separated one from the other: *Anodonta*, s. str., with the embryos in the outer gills, and placed, therefore, in the subfamily Unioninæ, division Homogenæ; and *Glabaris* (Gray), with the embryos in the inner gills, family Mutelidæ, most of them South-American. This distinction will probably hold good, the geographical distribution of *Glabaris* extending, according to Simpson himself, from the Argentine Republic to the Island of Trinidad (*G. liotaudi*, Guppy), and to the River Medellin in Eastern Mexico (*G. cylindracea*, Lea). As regards the sculpture of the summits, he states that the true *Anodontæ* have "numerous more or less parallel ridges, usually somewhat doubly looped," and that *Glabaris* has the "beaks full, smooth." This is a character visible also in dry specimens: it holds good in the European *Anodontæ*; but as to the exotic species it cannot usually be ascertained, full-grown examples with worn summits being often only available for examination.

Amongst the Mexican species, the following have waved wrinkles on the summits, *A. coarctata*, *A. richardsoni*, and *A. exilior*, which are thus proved to be true *Anodontæ*. I have already placed (*anteà*, pp. 524, 525) the Mexican and Central-American forms under two groups, one with a small rounded, and one with a deeper-pointed, sinulus at the hinder end of the hinge-line; the latter belong to *Glabaris*, according to Simpson, and they have also, so far as I can ascertain, rather swollen (full) and smooth summits. This difference in the shape of the sinulus will perhaps help to locate the position of full-grown dry specimens with worn summits in the

genus *Anodonta* or *Glabaris*. But Simpson places three species of my first subdivision in his *Glabaris*, viz. *A. strebeli*, *A. glauca*, and *A. grijalvæ*: as regards *A. glauca*, this may perhaps be understood by the confusion made by several authors between *A. glauca* and *A. ciconia* (see *anteà*, pp. 532, 537), the true North-west Mexican *A. glauca* being, I suppose, nearer to *A. globosa* than to *A. ciconia*; while as to the two others, I must leave future workers to decide when the living animal is examined.

Anodonta coarctata (p. 525).

I am glad to state that Simpson also (*loc. cit.* p. 630) unites *A. coarctata* and *A. chapalensis* into one species.

Anodonta exilior (p. 530).

A. "*glabrus*," Sow.,=*A. viridana*, Clessin, is considered by Simpson (*loc. cit.* p. 922) to be synonymous with *Glabaris inæquivalvis*, Lea, from the Lake of Nicaragua. On again comparing the original figures, I find that the outline of *A. glabrus*, in its shelving fore part and nearly straight ventral margin, agrees very well with that of *A. exilior*, and not at all with that of *A. inæquivalvis*, so I must persist in retaining the two forms as distinct.

Anodonta chalcoensis (p. 530).

This is treated by Simpson (*loc. cit.* p. 630) as synonymous with *A. exilior*; he gives the habitat of the latter as "Mexico, mostly to the Pacific drainage," which differs from the statements I have made concerning the locality of *A. exilior* and *A. chalcoensis*. Simpson supposes *A. impura*, Say, to be identical with *A. henryana*, but he also has not seen Say's specimen.

Anodonta lurulenta (p. 531).

Simpson (*loc. cit.*) separates *A. strebeli*, Lea, far apart from *A. lurulenta*, Morelet, and places it in the genus *Glabaris*. I dare not oppose this course, for on a fresh examination of Lea's figure I find that the sinulus is rather deep and pointed, as in *Glabaris*, though the general outline is very like that of *A. lurulenta*.

Anodonta globosa and **A. nopalatensis** (pp. 532, 533).

According to Simpson (*loc. cit.* p. 646), *A. globosa* is the young and *A. nopalatensis* the adult state of the same species; but the name *A. globosa* must be retained, on account of priority. He mentions a specimen $7\frac{1}{2}$ inches (190 mm.) long and $5\frac{1}{2}$ inches (139 mm.) high.

MYCETOPUS (p. 539).

Mycetopus weddelli (p. 540).

Simpson (*loc. cit.*) identifies this species with *M. pygmæus*, Spix: I cannot adopt

this view, *M. pygmæus* being more attenuated and ascending in its fore end, more rounded and blunt in its hinder extremity. Hupé, in Castelnau's work (quoted above, p. 540), figures both species. The differences are well shown, and are corroborated by the specimens in the Berlin Museum; shells collected at Putumayo, Ecuador, by Hopke and Dübrich, pertaining evidently to *M. weddelli*, help to fill the gap in the geographical distribution between Nicaragua and Chiquitos.

PISIDIUM (p. 554).

3. Pisidium compressum.

Pisidium compressum, Prime, Proc. Bost. Soc. Nat. Hist. iv. p. 164 (1851) [1]; Monogr. Am. Corbiculadæ, p. 64, fig. 67 [2]; A. Gould, Rep. Invertebr. Massach. ed. 2, p. 110, fig. 419 (same figure) [3]; Dall, Proc. U.S. Nat. Mus. xix. p. 370 (1896) [4].

Very unequilateral and high, with a wing-shaped appendix on the summits.
Long. 4, alt. $3\frac{1}{2}$, diam. $2\frac{1}{5}$ millim.

Hab. N. Central Mexico: Lake Palomas, Mimbres Valley (*Mearns* [4]).

Widely distributed in North America, from Canada and New England to Ohio and Arizona [1–4]. Analogue of the European *P. supinum*, A. Schmidt.

EXPLANATION OF PLATES.

[All figures are natural size, unless otherwise stated, the enlargement being indicated by the figures at the end of each line, thus $\frac{3}{2}$ (one and a half times), &c. Plates I.–XV. were drawn by E. Duval, and the others by Fr. H. v. Zglinicka, both of Berlin; II.–XV. were lithographed in England, the rest in Berlin; I.–XXVIII. only are coloured.]

PLATE I.

Fig. 1. *Cyclotus dysoni*, Pfr., var. *affinis*, n. (p. 4), Bugaba, from three sides.
2. —— ——, specimen of smaller size, from San Isidro (p. 4), from three sides.
3. *Choanopoma rigidulum*, Morel. (p. 16), Vera Paz, from two sides, $\frac{2}{1}$.
4. *Chondropoma andrewsæ*, Ancey (p. 16), Honduras, specimen received from M. Ancey, from two sides, $\frac{3}{2}$.
5. —— *subangulatum*, n. (p. 17), Teleman, from two sides, $\frac{3}{2}$.
6. *Helicina succincta*, n. (p. 36), Cordova, from three sides, $\frac{3}{2}$.
7. —— *deppeana*, v. Mart. (p. 32): *a*, *b*, two typical specimens, dorsal view.
8. —— ——, var., from Yalalag (p. 32), from three sides, and sculpture of the surface, $\frac{4}{1}$.
9. —— *succincta*, var. (p. 36), Misantla: *a*, *b*, two specimens, *c*, a young one, and sculpture, $\frac{7}{2}$.

Fig. 10. *Helicina punctisulcata,* n. (p. 36), Omilteme, typical specimen, from three sides, and another varying in colour, and sculpture, $\frac{4}{1}$.

11. —— *oweniana,* Pfr., c. *anozona,* v. Mart. (p. 38), Coban, from three sides, $\frac{3}{2}$.

12. —— ——, a. *genuina* (p. 38), Teapa, from three sides, $\frac{3}{2}$.

13. —— *chrysocheila,* Binn., var. *shuttleworthi,* n. (p. 33), Cordova, from two sides, and sculpture, $\frac{3}{1}$.

14. —— *chryseis,* Tristr. (p. 39), Vera Paz, original specimen of Tristram, from three sides, $\frac{3}{1}$.

15. —— *borealis,* n. (p. 40), Villa Lerdo, from three sides.

16. —— *dysoni,* Pfr., var. *jansoni,* n. (p. 40), Bonacca I.: *a,* typical specimen; *b, c,* variations in colour, all $\frac{3}{1}$.

17. *Cyclotus dysoni,* Pfr. (p. 3), Retalhuleu, living animal, from a drawing made by Dr. O. Stoll.

18. *Helicina lirata,* Pfr. (p. 41), Retalhuleu, living animal, from a drawing made by Dr. O. Stoll.

19. *Diplommatina stolli,* n. (p. 20), Cholhuitz: *a, b,* two views, both $\frac{5}{1}$.

PLATE II.

Fig. 1. *Glandina indusiata,* Pfr. (p. 54), Oaxaca: 1 *a,* a rather more slender specimen from the same locality.

2. —— *vanuxemi,* Lea (*coronata,* Pfr.) (p. 54), an unusually large specimen, from Omilteme: 2 *a,* sculpture near the suture of the same shell, $\frac{2}{1}$; 2 *b,* an unusually dark-coloured example, also from Omilteme; 2 *c,* a very young specimen from Tehuacan.

3. —— *sowerbyana,* Pfr. (p. 55), Jalapa, a not full-grown specimen: 3 *a,* lateral view of the aperture of the same shell; 3 *b,* young, and *c,* a still younger example, also from Jalapa.

4. —— *coulteri,* Gray (*uhdeana,* v. Mart.) (p. 56), a large specimen from Zimapan, in the Peel Park Museum, from a drawing sent by G. B. Sowerby: 4 *a,* a specimen from Jalapa; 4 *b,* lateral view of the aperture, and 4 *c,* sculpture near the suture, of the same shell, $\frac{2}{1}$.

PLATE III.

Fig. 1. *Glandina cuneus,* n. (p. 56), Omilteme: 1 *a,* dorsal view of the same specimen; 1 *b,* sculpture of the suture, $\frac{3}{1}$; 1 *c,* young specimen from the same locality.

2. —— ——, another specimen from Omilteme: 2 *a,* back view.

3. —— *liebmanni,* Pfr. (p. 61), Chilpancingo.

4. —— ——, another specimen from the same locality.

5. —— *audebardi,* Desh., *a.* typica (p. 62), "Mexico": 5 *a,* lateral view of the aperture.

6. —— ——, another specimen, from Venta de Zopilote: 6 *a,* sculpture at the suture of the same shell, $\frac{3}{1}$.

7. —— ——, var. *amœna,* v. Mart. (p. 63), Vera Cruz: 7 *a,* sculpture at the suture, $\frac{3}{1}$.

8. —— ——, var. *minor,* n. (p. 63), Tehuantepec.

9. —— *longula,* Fisch. & Cr., var. *jalapana,* n. (p. 64), a specimen from Misantla: 9 *a,* sculpture at the suture, $\frac{4}{1}$.

10. —— ——, a specimen from Jalapa.

PLATE IV.

Fig. 1. *Glandina lanceolata,* n. (p. 69), Omilteme: 1 *a,* summit of the shell, $\frac{2}{1}$; 1 *b,* sculpture at the suture, $\frac{3}{1}$.

2. —— *mazatlanica,* n. (p. 65): 2 *a,* sculpture at the suture, $\frac{3}{1}$.

3. —— ——, var. *abbreviata,* n. (p. 65), Tres Marias Is.

4. —— *pseudoturris,* Strebel (p. 65), Tierra Colorada: 4 *a,* sculpture at the suture, $\frac{3}{1}$.

5. —— *simplex,* Strebel (p. 66), Oaxaca, typical specimen in the Berlin Museum: 5 *a,* sculpture at the suture, $\frac{3}{1}$.

6. —— ——, "Mexico," typical specimen of *G. candida,* Shuttleworth, in the Berne Museum.

7. —— *cumingi,* Beck, var. *flavida,* n. (p. 59), Retalhuleu, drawing of living animal made by Dr. O. Stoll.

8. —— *conularis,* Pfr. (p. 66), "Mexico," typical specimen in the British Museum, drawn by E. Smith.

9. —— *excavata,* n. (p. 67), Mazatlan: 9 *a,* lateral view of the aperture.

10. —— *albersi,* Pfr. (p. 75), Tres Marias Is.: 10 *a,* sculpture of the suture, $\frac{3}{1}$.

11. —— ——, var. *inflata,* n. (p. 75), Tepic.

12. —— *decidua,* Pfr. (p. 70), Juquila, from a specimen in the British Museum.

13. —— ——, Juquila, not full-grown, Pfeiffer's original specimen in the British Museum, both drawn by E. Smith.

14. —— *largillierti,* Pfr. (p. 67), Merida, Yucatan: 14 *a,* summit of the shell, $\frac{2}{1}$; 14 *b,* sculpture at the suture, $\frac{3}{1}$; 14 *c* and 14 *d,* younger specimens from the same locality.

15. —— ——, another specimen from Merida, differing in shape, but quite similar in sculpture and colour.

16. —— *turgida,* Pfr. (p. 73), Juquila, typical specimen in the British Museum, drawn by E. Smith.

17–20. —— ——, var. *sayulana,* n. (p. 73), four specimens, from Sayula, somewhat different in form: 20 *a,* summit of the shell, $\frac{5}{2}$.

PLATE V.

Fig. 1. *Glandina sulcifera,* n. (p. 74), Jalisco: 1 *a,* summit of the shell, $\frac{2}{1}$; 2 *b,* sculpture at the suture, $\frac{3}{1}$.

2. —— *filosa,* Pfr. (p. 74), Orizaba, specimen from Pfeiffer's collection: 2 *a,* summit, 2 *b,* sculpture at the suture, both $\frac{3}{1}$.

3. —— *fischeri,* n. (p. 74), Toluca: 3 *a,* summit, $\frac{2}{1}$.

4. —— *delicatula,* Shuttl. (p. 70), Cordova, typical specimen from Shuttleworth's collection in the Berne Museum.

5. —— ——, var. *major,* n. (p. 70), Coatepec: 5 *a,* sculpture at the suture, $\frac{4}{1}$.

6. —— *oblonga,* Pfr. (p. 69), specimen from Pfeiffer's collection, now in Stettin: 6*a,* summit, $\frac{4}{1}$; 6 *b,* sculpture at the suture, $\frac{2}{1}$.

7. —— *nana,* Shuttl. (p. 77), Cordova, typical specimen from Shuttleworth's collection in the Berne Museum.

Fig. 8. *Salasiella margaritacea,* Pfr. (p. 81), Cordova, specimen from Paetel's collection, now in the Berlin Museum, $\frac{2}{1}$.

9. —— *pulchella,* Pfr. (p. 83), Chiapas, typical specimen in the British Museum, drawn by E. Smith.

10. *Streptostyla dubia,* Pfr. (p. 90), Chiapas, typical specimen in the British Museum, drawn by E. Smith, $\frac{3}{1}$.

11. —— *bullacea,* Pfr. (p. 93), Tabasco, typical specimen in Dr. Pfeiffer's collection, probably the young state of *S. shuttleworthi,* Pfr.

12. —— *obesa,* n. (p. 95), Honduras : 12 *a,* sculpture at the suture, $\frac{3}{1}$.

13. —— *cylindracea,* Pfr. (p. 93), Tortilla, specimen in Dr. Pfeiffer's collection.

14. —— *coniformis,* Shuttl. (p. 94), young specimen, for comparison with the following.

15. —— *conulus,* n. (p. 94), Sayula.

16. —— *labida,* Morel. (p. 96), Vera Paz, typical specimen from Morelet's collection.

17. —— *biconica,* Pfr. (p. 98), Chiapas, specimen in Albers's collection, now in the Berlin Museum : 17 *a,* lateral view of the aperture.

18. —— *delibuta,* Morel. (p. 97), Vera Paz, typical specimen from Morelet's collection : 18 *a,* sculpture at the suture, $\frac{4}{1}$.

19. —— *flavescens,* Shuttl., var. *boucardi,* Pfr. (p. 99), Juquila, Dr. Pfeiffer's type in the British Museum, drawn by E. Smith.

20. —— *ventricosula,* Morel. (p. 97), Merida, typical specimen from Morelet's collection.

21. —— ——, var. *binneyana,* Cr. & Fisch. (p. 97), Costa Rica : 21 *a,* younger specimen from the same locality.

22. —— *sololensis,* Cr. & Fisch. (p. 101), Tepan.

23. —— ——, another specimen from the same locality.

24. —— *limnæiformis,* Shuttl., var. *parvula,* Pfr. (p. 100), Chiapas, from Dr. Pfeiffer's collection.

25. —— *meridana,* Morel. (p. 101), Merida, typical specimen from Morelet's collection.

26. —— ——, var. *cobanensis,* Tristr. (p. 101), Coban, Tristram's typical specimen.

PLATE VI.

Fig. 1. *Omphalina lucubrata,* Say (p. 106), Cordova : 1 *a,* 1 *b,* 1 *c,* views from three sides.

2. —— ——, variety from Las Vigas : 2 *a* and 2 *b,* views from above and from below.

3. —— ——, another, darker reddish above, Cordova, collected by Höge.

4. —— ——, var. *deppeana,* n. (p. 107), Orizaba : 4 *a* and 4 *b,* views from above and from below.

5. —— ——, pale-coloured variety from Cordova.

6. —— *bilineata,* Pfr., var. *apicalis,* n. (p. 110), Cordova, view from above.

7. —— *modesta,* n. (p. 110), Las Vigas : 7 *a* and 7 *b,* views from above and from below.

8. —— *veracruzensis,* Pfr., var., specimen in Albers's collection, mentioned on p. 112 : 8 *a* and 8 *b,* views from above and from below ; 8 *c,* sculpture at the suture of the same specimen, $\frac{4}{1}$.

9. *Hyalinia nitidopsis,* Morel. (p. 115), Salama, specimen from Morelet's collection, $\frac{2}{1}$: 9 *a* and 9 *b,* views from above and from below ; 9 *c,* natural size ; 9 *d,* sculpture at the suture, $\frac{4}{1}$.

Fig. 10. *Omphalina sculpta*, n. (p. 113), Omilteme: 10 *a* and 10 *b*, views from above and from below; 10 *c*, sculpture at the suture, $\frac{4}{1}$.

11. *Hyalinia hoffmanni*, n. (p. 115), Quebrada Honda, $\frac{2}{1}$: 11 *a* and 11 *b*, views from above and from below; 11 *c*, natural size.

12. —— *paucilirata*, Morel. (p. 118), Salama, specimen from Morelet's collection, $\frac{2}{1}$: 12 *a* and 12 *b*, views from above and from below; 12 *c*, natural size.

13. —— *arborea*, Say (p. 116), Mexican specimen from Las Vigas, $\frac{3}{1}$: 13 *a* and 13 *b*, views from above and from below; 13 *c*, natural size.

14. —— *glomerula*, n. (p. 115), San Luis de Peten, specimen from Morelet's collection, $\frac{2}{1}$: 14 *a*, *b*, *c*, views from three sides; 14 *d*, natural size.

15. —— *stolli*, n. (p. 118), Retalhuleu, $\frac{4}{1}$: 15 *a* and 15 *b*, views from above and from below; 15 *c*, natural size.

16. *Guppya championi*, n. (p. 119), Purula, $\frac{2}{1}$: 16 *a* and 16 *b*, views from above and from below; 16 *c*, natural size.

17. —— *trochulina*, Morel. (p. 120), San Luis de Peten, Morelet's original specimen, $\frac{2}{1}$; 17 *a*, *b*, *c*, views from three sides; 17 *d*, natural size.

18. —— *pittieri*, n. (p. 121), San Francisco de Los Rios near San José, $\frac{4}{1}$: 18 *a*, *b*, *c*, views from three sides; 18 *d*, natural size.

19. —— *biolleyi*, n. (p. 121), La Urraca near San José, $\frac{4}{1}$: 19 *a*, *b*, *c*, views from three sides; 19 *d*, natural size.

20. —— *orosciana*, n. (p. 123), Calera de San Ramon, $\frac{4}{1}$: 20 *a*, *b*, *c*, views from three sides; 20 *d*, natural size.

PLATE VII.

Fig. 1. *Pseudohyalina cidariscus*, n. (p. 126), Palenque, from Morelet's collection, $\frac{4}{1}$: 1 *a*, *b*, *c*, views from three sides; 1 *d*, natural size.

2. *Patula* (*Thysanophora*) *turbinella*, Morel. (p. 129), Peten, specimen from Morelet's collection, $\frac{2}{1}$: 2 *a*, view from below; 2 *b*, natural size.

3. *Helix* (*Acanthinula*) *punctum*, Morel. (p. 131), Merida, from Morelet's collection, $\frac{4}{1}$: 3 *a*, view from below; 3 *b*, natural size.

4. —— (*Trichodiscina*) *suturalis*, Pfr., var. *pressula*, Morel. (p. 136), Purula: 4 *a* and 4 *b*, view from above and from below.

5. *Polygyra implicata*, Beck (p. 164), Jalapa, $\frac{2}{1}$: 5 *a* and 5 *b*, views from above and from below; 5 *c*, more enlarged view of the aperture, and seen in a different direction, showing more fully its whole extent.

6. —— *couloni*, Shuttl. (p. 167), Maltrata: 6 *a* and 6 *b*, views from above and from below; 6 *c*, more enlarged view of the aperture; 6 *d*, young specimen.

7. —— *dissecta*, n. (p. 167), Toluca: 7 *a* and 7 *b*, views from above and from below; 7 *c*, enlarged view of the aperture.

8. —— *bicruris*, Pfr. (p. 168), Ventanas: 8 *a* and 8 *b*, views from above and from below; 8 *c*, enlarged view of the aperture.

9. —— *richardsoni*, n. (p. 168), Mazatlan: 9 *a* and 9 *b*, views from above and from below; 9 *c*, enlarged view of the aperture.

Fig. 10. *Polygyra ventrosula,* Pfr. (p. 169), Tres Marias Is.: 10 *a* and 10 *b,* views from above and from below; 10 *c,* enlarged view of the aperture.
11. —— ——, var. *hindsi,* Pfr. (p. 169), Tres Marias Is.
12. *Helix* (*Praticolella*) *berlandieriana,* Moric. (p. 140), Vera Cruz, large specimen: 12 *a,* view from below; 12 *b,* smallest specimen from Vera Cruz, mentioned on p. 141 (incorrectly quoted as fig. 14).
13. —— (——) ——, var. *griseola,* Pfr., smallest specimen, Vera Cruz (p. 142).
14. —— (——) ——, unusually flat specimen, Vera Cruz (p. 142).
15. —— (——) ——, var. *griseola,* Pfr. (p. 140), Vera Cruz, unusually large specimen.
16. —— (——) ——, ditto, Vera Cruz, small but full-grown specimen: 16 *a,* view from below.
17. —— (——) ——, ditto, not full-grown specimen, nearly unicolorous, also from Vera Cruz, p. 142.
18. —— (*Arionta*) *flavescens,* Wiegm. (p. 142), Misantla: 18 *a, b, c,* views from three sides; 18 *d,* coloration of the upper, 18 *e,* of the lower side, both enlarged.
19. —— (*Pomatia*) *aspersa,* Müll. (p. 144), Mexican specimen obtained by Höge, unusually high.
20. —— (*Lysinoë*) *humboldtiana,* Férussac, var. *högeana,* n. (p. 148), Chihuahua, smaller specimen.
21. —— (——) ——, ditto, ditto, larger specimen.
22. —— (——) ——, var. *badiocincta,* Wiegm. (p. 148), Mexico: 22 *a,* dorsal view.

PLATE VIII.

Fig. 1. *Helix* (*Lysinoë*) *ghiesbreghti,* Nyst, var. *subaurantia,* n. (p. 151), Purula: 1 *a,* dorsal view; 1 *b,* from below; 1 *c,* hairs of the upper surface, $\frac{3}{1}$; 1 *d,* those of the lower surface, $\frac{4}{1}$.
2. —— (——) ——, var. *strubelli,* Böttg. (p. 151), Mosquito Coast, typical specimen of Böttger.
3. —— (——) ——, typica (p. 150), young specimen, Cerro Zunil: 3 *a,* hairs of the upper surface, $\frac{6}{1}$.
4. —— (——) ——, Hacienda Buenavista, living animal, from a drawing by Dr. O. Stoll.

PLATE IX.

Fig. 1. *Helix* (*Oxychona*?) *trigonostoma,* Pfr., var. *intermedia,* Fisch. & Cr. (p. 155), Cerro Zunil: 1 *a,* view from below.
2. —— (——) ——, var. *stolliana* (p. 155), Cerro Zunil: 2 *a,* view from below.
3. —— (——) ——, ditto, Cerro Zunil, another specimen: 3 *a,* view from below.
4. —— (——) ——, ditto, Cholhuitz*: 4 *a,* view from below.
5. —— (——) ——, ditto, Cerro Zunil: 5 *a,* view from below.
6. —— (——) ——, var. *elevato-conica,* Fisch. & Cr. (p. 154), Vera Paz: 6 *a,* view from below.

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* This locality was not specially mentioned on p. 155: it is on the Pacific slope of Guatemala.

Fig. 7. *Helix* (*Oxychona*?) *trigonostoma*, var. *stolliana*, n. (p. 155), Cerro Zunil, another specimen: 7 *a*, view from below.

8. —— (——) ——, var. *freytagiana* (Dohrn), n. (p. 155), Honduras: 8 *a*, view from below.

9. —— (——) ——, ditto, Honduras, Dohrn's typical specimen: 9 *a*, view from below.

10. —— (——) *altispira* (Dohrn), n. (p. 156), Honduras, Dohrn's typical specimen: 10 *a*, view from below; 10 *b*, sculpture, $\frac{2}{1}$.

11, 12. —— (——) *trigonostoma*, Pfr., var. *stolliana*, n. (p. 155), Cholhuitz, living animals from drawings by Dr. O. Stoll.

PLATE X.

Fig. 1. *Strobila salvini*, Tristr. (p. 174), Vera Paz, $\frac{6}{1}$: 1 *a*, *b*, views from above and from below; 1 *c*, young specimen, seen from below, showing the spiral lamellæ, same magnification.

2. *Labyrinthus triplicatus*, v. Mart. (p. 176), Costa Rica, original specimen given by J. Carmiol to the Berlin Museum: 2 *a*, view from below; 2 *b*, *c*, enlarged views of the aperture, showing the difference in the size of the plaits in two specimens.

3. *Ortalichus princeps*, Sow. (p. 182), very young specimen from Zapote; 8 *a*, *b*, *c*, different views.

4. —— ——, very large, probably full-grown, specimen, Vera Cruz.

5. —— ——, normal specimen, Chacoj, collected by Uhde.

6. —— ——, smaller specimen with reduced streaks, Costa Rica.

7. —— ——, var. *fischeri*, n. (p. 183), San Isidro.

8. —— *ferussaci*, v. Mart. (p. 184), Zacapa.

9. —— ——, Tehuantepec, one of the typical specimens of my first description.

10. —— ——, Zacapa, living animal, from a drawing made by Dr. O. Stoll.

11. —— *lividus*, v. Mart. (p. 186), Volcan Jorullo, typical specimen, very large.

12. —— *zoniferus*, Strebel (p. 186), specimen received from Gust. Schneider, probably coming from Strebel's collection.

13. —— ——, Venta de Zopilote.

PLATE XI.

Figs. 1, 2, 3. *Ortalichus macluræ*, n. (p. 188), Cacao, Nicaragua, three differently-coloured specimens from the same locality.

4, 5. —— *boucardi*, Pfr. (p. 187), Villa Alta.

6. —— *melanochilus*, Val. (p. 190), specimen from an unknown locality, most like the type of Valenciennes.

7. —— ——, Tres Marias Is.: 7 *a*, back view.

8. —— *tricinctus*, n. (p. 185), Terraba.

9. —— *ponderosus*, Strebel (p. 190), Dos Arroyos.

10. —— ——, San Blas.

11. —— *boucardi*, Pfr., var. (p. 187), specimen with more numerous streaks, Oaxaca.

PLATE XII.

Fig. 1. *Otostomus fenestratus*, Pfr. (*piescheli*, v. Mart.) (p. 200), Manzanillo, type of *Bulimulus piescheli*: 1 *a*, back view; 1 *b*, sculpture, $\frac{3}{1}$.

2. —— *dombeyanus*, Pfr. (p. 199), young specimen from Venta de Zopilote, showing a spiral band: 2 *a*, back view.

3. —— *lilacinus*, Reeve, var. *jansoni*, n. (p. 201), Nicaragua: 3 *a*, back view; 3 *b*, sculpture, $\frac{2}{1}$.

4. —— ——, var. *undulosus*, n. (p. 201), Cerro Zunil.

5. —— ——, var. *ictericus*, n. (p. 202), Cerro Zunil.

6. —— ——, var. *unicolor*, n. (p. 201), Cholhuitz, living animal from a drawing made by Dr. O. Stoll.

7. —— *josephus*, Angas, var. *maculosus*, n. (p. 202), Rio Pacuare del Sur.

8. —— ——, var. *concolor*, n. (p. 202), Terraba.

9. —— ——, ditto, Rio Savegal: 9 *a*, aperture seen from the side, showing the angle of the columellar margin.

10. —— ——, ditto, aperture of a very large specimen, natural size.

11. —— *delattrei*, Pfr., A. *b* (p. 204), San Gerónimo: 11 *a*, back view; 11 *b*, sculpture, $\frac{2}{1}$.

12. —— ——, A. *c* (p. 204), Coban, an abnormal specimen, slightly angulated.

13. —— ——, var. *hiabundus*, n., B. *e* (p. 205), Cerro Zunil: 13 *a*, back view.

14. —— ——, ditto, B. *d* (p. 205), Cerro Zunil: 14 *a*, back view.

15. —— *chiapensis*, Pfr., var. *quadrifasciatus*, n. (p. 205), Cerro de Palmas.

16. —— *castus*, Pfr., var. *xantholeucus*, n. (p. 206), Sabo: 16 *a*, back view.

17. —— ——, A. *b* (p. 206), Coban.

18, 19. —— ——, A, *c* (p. 206), Coban.

20. —— ——, var. *porrectus*, n., C. *a* (p. 206), Vera Paz.

21. —— ——, ditto, C. *b* (p. 206), Vera Paz.

PLATE XIII.

Fig. 1. *Otostomus dunkeri*, Pfr. (p. 207), Michoacan.

2. —— ——, var. *forreri*, Mouss. (p. 207), Ventanas: 2 *a*, back view.

3, 4. —— *sulcosus*, Pfr. (p. 208), Sierra de las Aguas Escondidas: 3 *a*, sculpture, $\frac{3}{1}$.

5. —— *ghiesbreghti*, Pfr., var. *stolli*, n. (p. 210), Antigua: 5 *a*, back view.

6. —— ——, ditto, Quezaltenango, living animal, from a drawing made by Stoll.

7. —— ——, ditto, Quezaltenango.

8. —— ——, ditto, Volcan de Agua.

9. —— ——, var. *interstitialis*, n. (p. 210), Cumbre de San Martin.

10. —— ——, var. *stolli*, n. (p. 210), Volcan de Agua, extraordinarily narrow specimen.

11, 12, 13. —— *jonasi*, Pfr. (p. 212), Antigua, different forms from the same locality.

14. —— *hegewischi*, Pfr., var. *d* (p. 211), Omilteme.

Fig. 15. *Otostomus attenuatus*, Pfr. (p. 215), Cordova: } *a*, back view; *b*, aperture seen from the
16. —— ——, var. *varicosus*, Pfr. (p. 216), Cordova: } side, showing the twisting of the columellar margin.
17. —— *trimarianus*, n. (p. 216), Tres Marias Is.: 17 *a*, back view.
18, 19, 20. —— *hepatostomus*, Pfr. (p. 217), Juquila.
21. —— *bugabensis*, n. (p. 218), Bugaba: 21 *a*, back view.

PLATE XIV.

Fig. 1. *Otostomus inglorius*, Reeve, var. *heynemanni*, Pfr. (p. 220), Tlacolula: 1 *a*, back view.
2. —— *sargi*, Crosse & Fisch., var. *motaguæ*, n. (p. 218), Valley of the Rio Motagua: 2 *a*, back view.
3. —— *maculatus*, Lea (p. 220), Champerico, living animal, from a drawing made by Dr. O. Stoll.
4. —— *inglorius*, Reeve, var. *heynemanni*, Pfr. (p. 220), Tlacolula, a more elongated specimen: 4 *a*, back view.
5. —— *championi*, n. (p. 222), Cerro Zunil.
6, 7. —— *emeus*, Say (*palpaloensis*, Strebel) (p. 222), Eastern Mexico: 6 *a*, 7 *a*, back views.
8. —— ——, var. *albivaricosus*, n. (p. 223), Playa Vicente: 8 *a*, back view.
9, 10. —— *moritinctus*, n. (p. 228), Chilpancingo: 9 *a*, 10 *a*, back views; 9 *b*, upper whorls, $\frac{6}{1}$.
11. —— *tripictus*, Albers, var. *hoffmanni*, n. (p. 225), Heredia.
12. —— *irazuensis*, n., var. *c* (p. 224), Costa Rica: 12 *a*, back view.
13. —— ——, var. *b* (p. 224), Irazu: 13 *a*, back view.
14. —— *sulfureus*, Pfr. (p. 225), Nicaragua.
15. —— ——, var. *albidus*, n. (p. 226), Jalapa, unusually ventricose specimen.
16, 17. —— ——, var. *citronellus*, Ang. (p. 226), Costa Rica.
18. —— ——, var. *obesus*, n. (p. 226), Huatusco.
[19, 20. —— *liliaceus*, Fér., from Puerto Rico, for comparison with *O. sulfureus* (p. 226).]

PLATE XV.

Fig. 1. *Otostomus uhdeanus*, v. Mart., var. *a* (p. 234), } typical specimens collected by Uhde in Mexico.
2. —— ——, var. *c* (p. 234), }
3. —— ——, var. *b* (p. 234), }
4. —— ——, var. *cuernavacensis*, Cr. & Fisch. (p. 234), Orizaba, back view.
5. —— ——, var. *tepicensis*, n. (p. 234), Tepic.
6. —— ——, var. *borealis*, n. (p. 234), Ventanas.
7. —— *livescens*, Pfr. (p. 228), Tehuacan, normal form.
8. —— ——, var. *d* (p. 229), Tehuacan, found with the preceding.
9. *Bulimulus corneus*, Sow. (p. 246), Retalhuleu, living specimen, from a drawing made by Dr. O. Stoll.
10. *Otostomus semipellucidus*, Tristr. (p. 236), Guanacasta: 10 *a*, back view.

Fig. 11. *Bulimulus durangoanus*, n. (p. 246), Villa Lerdo.
12–16. —— *schiedeanus*, Pfr. (p. 239), Tehuacan, different forms.
17. —— ——, Villa Lerdo.
18. —— ——, specimen from an unknown locality.
19, 20, 21, 22. —— ——, somewhat deformed and abbreviated examples, found at Tehuacan among more normal ones.
23. —— ——, young specimen, Tehuacan.
[24. —— *alternatus*, Say (p. 243), dark-streaked specimen, Texas: 24 *a*, back view; 24 *b*, aperture seen from the side, showing the columellar tubercle.]
[25. —— —— (p. 243), white specimen (*B. mariæ*, Albers), Texas.]
[26. —— ——, unusually broad example, approaching in general form to *B. schiedeanus*, Texas.]

PLATE XVI.

Fig. 1. *Otostomus attenuatus*, Pfr., var. *pittieri*, n. (p. 216), Alto de Mano Tigre.
2. *Cœlocentrum clava*, Pfr., var. *rufescens*, n. (p. 271), Mexico.
3, 4. *Eucalodium truncatum*, Pfr. (p. 264), normal forms, Angangueo? 4 *a*, summit of the shell, seen from above; 4 *b*, enlarged view of the sculpture; 4 *c*, base of the shell, seen from below.
5, 6, 7. —— ——, smaller full-grown forms, } also from Angangueo.
8, 9. —— ——, young specimens, }
10–16. *Holospira elizabethæ*, Pilsbry (*claviformis*, n.) (pp. 277, 635), Amula, the most different forms chosen from a very large number of specimens found at the same locality: 16, a young specimen. The figures below show the shell seen from the basal end.
17. —— *teres*, Menke, var. *hoegeana*, n. (p. 280), Maltrata.
18. —— *pfeifferi*, Menke, var. *minima*, n. (p. 280), Mexico.
19–24. —— *fusca*, n. (p. 281), Omilteme, the most different forms chosen from a large number of examples found at the same locality: 24, a not full-grown specimen. The figures below show the shell seen from the basal end.
25. —— *imbricata*, v. Mart. (p. 273), Mexico, type-specimen, copied from Malak. Blätt. xii. t. 1. fig. 2 (1865).
26. *Cœlocentrum championi*, n. (p. 269), Cerro Zunil: 26 *a*, shell seen from the basal end 26 *b*, view of the columella within the whorls; 26 *c*, enlarged view of the sculpture.
27. —— *gigas*, n. (p. 267), Livingston, young specimen.
28. —— ——, Livingston, full-grown specimen: 28 *a*, upper end of the full-grown truncated shell from above; 28 *b*, basal end; 28 *c*, enlarged view of the sculpture.
29. —— *clathratum*, n. (p. 269), Hacienda Buenavista: 29 *a*, upper end of the truncated shell; 29 *b*, basal end, seen from below; 29 *c*, enlarged view of the sculpture.
30. —— ——, same locality, living animal, from a drawing made by Dr. O. Stoll.
31–34. *Eucalodium strebeli*, Pfeffer (p. 265), Cerro de Palmas, the most different forms chosen from a large number of specimens found at the same locality: 33 *a*, enlarged view of the sculpture.

PLATE XVII.

[The vertical lines indicate the natural size of the shells.]

Fig. 1. *Holospira polygyrella,* v. Mart. (p. 284), Coban, $\frac{7}{2}$: 1 *a,* back view of the last whorls; 1 *b,* columella, within, still more enlarged view.

2. *Macroceramus concisus,* Morel., var. *mexicanus,* n. (p. 287), Orizaba, $\frac{5}{2}$.

3. *Holospira morini,* Morel., var. *pulchella,* n. (p. 285), Livingston, $\frac{3}{1}$: 3 *a,* back view of the last whorls.

4. —— *apiostoma,* Pfr. (p. 283), Cordova, greatly enlarged view of the columella.

5. —— *morini,* Morel., var. *salpinx,* Tristr. (p. 285), North Guatemala, Tristram's type-specimen, $\frac{4}{1}$.

6. *Opeas bocourtianum,* Cr. & Fisch., var. *pittieri,* n. (p. 292), La Palma, $\frac{5}{2}$.

7. —— *guatemalense,* Streb., var. *majus,* n. (p. 293), Miramar, $\frac{2}{1}$.

8. —— *gladiolus,* Cr. & Fisch. (p. 293), probably a young specimen of this species, from Merida, $\frac{7}{2}$.

9. —— *octonoides,* C. B. Ad. (p. 294), Costa Rica, $\frac{3}{1}$.

10. —— *micra,* d'Orb. (p. 294), Teapa, $\frac{5}{2}$.

11. —— ——, var. *caracasense,* Reeve (p. 294), Teapa, $\frac{5}{2}$.

12. —— *tryonianum,* Tate, var. *subovale,* n. (p. 296), Turubares, $\frac{4}{1}$.

13. *Subulina octona,* Chemn., var. *trochlea,* Pfr. (p. 299), Teapa,
14. —— *porrecta,* n. (p. 300), Teapa,
15. —— *stolli,* n. (p. 300), Vera Paz,

} all $\frac{3}{1}$: *a,* upper whorls; *b,* still more enlarged view of the aperture.

16. *Pseudosubulina trypanodes,* Pfr. (p. 303), Chiapas, $\frac{2}{1}$: 16 *a,* back view; 16 *b,* more enlarged view of the aperture. All three figures drawn by E. Smith from the typical specimen in the British Museum.

17. —— *fortis,* n. (p. 304), El Reposo, $\frac{3}{1}$: 17 *a,* upper whorls; 17 *b,* more enlarged view of the aperture.

18. —— *mitescens,* n. (p. 304), Dueñas, $\frac{5}{2}$: 18 *a,* upper whorls; 18 *b,* more enlarged view of the aperture.

19. —— *robusta,* n. (p. 304), Omilteme, $\frac{5}{2}$.

20. —— *lirifera,* Morel. (p. 304), Livingston, $\frac{3}{1}$: 20 *a,* upper whorls; 20 *b,* more enlarged view of the aperture.

21. —— *salvini,* n. (p. 305), Vera Paz, $\frac{5}{2}$: 21 *a,* upper whorls; 21 *b,* more enlarged view of the aperture.

PLATE XVIII.

[The vertical lines indicate the natural size of the shells.]

Fig. 1. *Spiraxis nitidus,* Streb., var. *major,* n. (p. 310), Las Vigas, not a full-grown specimen, $\frac{4}{1}$.

2. —— ——, var. *pittieri,* n. (p. 310), El Pital, $\frac{4}{1}$.

3. *Opeas subula,* Pfr. (p. 291), Antigua, living animal, from a drawing made by Dr. O. Stoll, $\frac{2}{1}$.

4. *Spiraxis sulciferus,* Morel. (p. 308), Retalhuleu, living animal, from a drawing made by Dr. O. Stoll, $\frac{3}{1}$.

5. —— *scalella,* n. (p. 311), El Pital, $\frac{4}{1}$.

6. *Tornaxis singularis,* n. (p. 311), Panzos, $\frac{4}{1}$.

Fig. 7. *Leptinaria pittieri*, n. (p. 317), La Palma, $\frac{3}{1}$.
8. —— ——, var. *obliquata*, n. (p. 317), Tarbaca, $\frac{3}{1}$.
9. —— *stolli*, n. (p. 316), Retalhuleu, living animal, from a drawing made by Dr. O. Stoll, the shell $\frac{5}{2}$: 9 *a*, aperture of a young specimen, oblique view, $\frac{5}{2}$.
10. —— *exigua*, n. (p. 318), Teapa, $\frac{3}{1}$.
11. —— *sinistra*, n. (p. 319), Acoyapa, $\frac{4}{1}$.
12. —— *crenulata*, n. (p. 318), Talamanca, $\frac{3}{1}$.
13. —— *guatemalensis*, Cr. & Fisch., var. *majuscula*, n. (p. 319), Rio Grande de Terraba, $\frac{4}{1}$.
14. —— *biolleyi*, n. (p. 319), San José, $\frac{4}{1}$.
15. —— *costaricana*, n. (p. 320), San José, Costa Rica, $\frac{7}{2}$.
16. —— *hapaloides*, n. (p. 321), Rio Grande de Terraba, $\frac{3}{1}$.
17. —— *ambigua*, n. (p. 321), Puerto Viejo, $\frac{3}{1}$.
18. —— *solida*, n. (p. 321), Puerto Viejo, $\frac{3}{1}$.
19. —— *elisæ*, Tristr. (p. 322), Coban, one of Tristram's typical specimens, $\frac{4}{1}$.
20. —— *convoluta*, n. (p. 322), Santa Clara, $\frac{7}{2}$: 20 *a*, aperture, seen from above, a little more enlarged.
21. —— *emmelinæ*, Tristr. (p. 323), Coban, young specimen from Salvin's collection, $\frac{5}{1}$.

PLATE XIX.

[The vertical lines indicate the natural size of the shells.]

Fig. 1. *Pupoides marginatus*, Say (p. 329), Mexico, $\frac{4}{1}$: two views, front and back.
2. *Succinea luteola*, Gould, var. *subtilis*, n. (p. 331), Vera Cruz,
3. —— ——, var. *rudiuscula*, n. (p. 331), Tehuacan,
4. —— *virgata*, v. Mart. (p. 334), Oaxaca,
5. —— ——, var. *hoegeana*, n. (p. 334), Oaxaca,
6. —— *costaricana*, n. (p. 338), Djiri Durunia,
7. —— *brevis*, Dunk. (p. 339), Zimapan, typical specimen from Dunker's collection,
8. —— *undulata*, Say, var. *moerchi*, Dunk. (p. 336), Zimapan,
9. —— *guatemalensis*, Morel. (p. 337), Antigua,
10. —— *undulata*, Say (p. 335), Mexico, obtained by Uhde,

} $\frac{3}{2}$, two views, front and back.

11. —— *ampullacea*, n. (p. 340), Ameca.
12. *Limnæa columella*, Say, var. *championi*, n. (p. 378), Bugaba, $\frac{3}{2}$.
13, 14. *Veronicella stolli*, n. (p. 351), Retalhuleu, living animal, from drawings made by Dr. O. Stoll.
15, 16. *Carychium exiguum*, Say, var. *mexicanum*, Pilsbry (p. 352), Helvetia, Cholhuitz, two specimens, $\frac{3}{1}$.
17, 18. —— ——, var. *costaricanum*, n. (p. 353), San José, two specimens, $\frac{3}{1}$.
19. *Physa* (*Aplecta*) *nitens*, Phil. (p. 357), Vera Cruz,
20. —— (——) *maugeriæ*, Gray (p. 354), specimen from the Paetel collection,
21, 22. —— (*Stenophysa*) *princeps*, Phil., var. *pallens*, n. (p. 364), Yucatan, two specimens,

} a little enlarged.

PLATE XX.

[Most of the figures are a little enlarged, the natural size indicated by the vertical line.]

Fig. 1. *Physa* (*Aplecta*) *impluviata*, Morel. (p. 358), Dueñas.

2, 3. —— (——) ——, var. *læta*, n. (p. 359), Vera Paz (Tristram's *P. aurantia*).

4. —— (*Stenophysa*) *nicaraguana*, Morel. (p. 366), Lake of Nicaragua, from a drawing of Morelet's type-specimen made by E. Smith: 4 *a*, back view.

5, 6. —— (*Aplecta*) *fuliginea*, Morel., var. *hoffmanni*, n. (p. 360), Laguna Redonda, two somewhat different specimens from the same locality: 5 *a*, back view.

7. —— (*Stenophysa*) *obtusa*, Cless. (p. 368), Honduras, type-specimen in Clessin's collection: 7 *a*, back view.

8. —— (——) *panamensis*, Meg. (p. 365), Panama, type-specimen from Anton's collection, now in the Dresden Museum.

9, 10. —— (*Aplecta*) *cisternina*, Morel., var. *minor*, Fisch. & Cr. (p. 362), San Antonio, two somewhat different specimens from the same locality.

11, 12. —— (——) *fuliginea*, Morel., var. *pliculosa*, n. (p. 361), Rio Reventazon, two somewhat different specimens from the same locality: 11 *a*, back view.

13. —— (*Alampetis*) *osculans*, Hald., var. *mexicana*, Phil. (p. 370), City of Mexico, obtained by Deppe.

14, 15. —— (——) *polakowskyi*, Cless. (p. 374), City of Guatemala, typical specimens in the Berlin Museum, $\frac{2}{1}$.

16. —— (——) *berendti*, Fisch. & Cr., var. *minima*, v. Mart. (p. 372), Orizaba, $\frac{5}{2}$.

17. —— (——) *osculans*, Hald., var. *coniformis*, Strebel (p. 371), Lake of Patzcuaro, obtained by Uhde.

18. —— (——) ——, var. *boucardi*, Cr. & Fisch. (p. 371), Mexico, obtained by Deppe, $\frac{2}{1}$.
N.B.—In this figure the line indicating the natural size, 15 millim., has been accidentally omitted.

PLATE XXI.

[All the figures of *Planorbis* in three views: in those which are enlarged the middle figure indicates the natural size.]

Fig. 1. *Planorbis tenuis*, Dunk. (p. 381), City of Mexico, obtained by Uhde.

2. —— ——, var. *uhdei*, n. (p. 385), Central Mexico.

3. —— ——, var. *applanatus*, n. (p. 384), Plateau of Mexico.

4. —— ——, var. *juvenilis*, n. (p. 384), City of Mexico.

5. —— *wyldi*, Tristr. (p. 387), Costa Rica, very young specimen, $\frac{3}{1}$.

6. —— *fieldi*, Tryon (p. 394), Lake of Nicaragua, $\frac{3}{1}$.

7. —— *tenuis*, Dunk. (p. 384), Mexico, young specimen: 7 *a*, a still younger one.

8. —— *caribæus*, d'Orb. (*ancylostomus*, Cr. & Fisch.) (p. 387), Vera Cruz, obtained by Uhde, a somewhat irregular specimen (see p. 388).

9. —— ——, Vera Cruz, young specimen: 9 *a*, a still younger one.

10. —— *nicaraguanus*, Morel. (p. 391), Lake of Nicaragua, type-specimen of Morelet, from a drawing made by E. Smith.

Figs. 11, 12. *Ancylus papillaris,* n. (p. 402), Rio Ameca, two somewhat different specimens from the same locality, $\frac{4}{1}$: 11 *a,* 12 *a,* lateral views.

13. *Planorbis maya,* Morel. (p. 392), Tabi, $\frac{2}{1}$.

14. —— *tepicensis,* n. (p. 393), Tepic, $\frac{3}{1}$.

15. —— *subpronus,* n. (p. 396), Amatitlan, $\frac{3}{1}$.

PLATE XXII.

Fig. 1. *Ampullaria flagellata,* Say, var. *tristrami,* Fisch. & Cr. (p. 413), Lake of Peten, Tristram's specimen of *Pomus columbiensis.*

2. —— *strebeli,* Fisch. & Cr. (p. 415), Misantla.

3. —— *violacea,* Val. (p. 414), Acapulco, specimen from Dunker's collection, now in the Berlin Museum.

4. *Amnicola rhegoides,* Morel. (p. 432), Lake of Coatepeque, Salvador, Morelet's type-specimen, from a drawing made by E. Smith, $\frac{3}{1}$.

5. —— *subangulata,* n. (p. 435), Costa Rica, $\frac{3}{1}$.

6. —— *costaricensis,* Mörch (p. 435), San José, Costa Rica, $\frac{5}{1}$.

7. *Ampullaria flagellata,* Say, var. *melanostoma,* Jonas (p. 411), Papantla, two views of the same specimen.

8. *Amnicola* (?) *melanioides,* n. (p. 436), Golfo Dulce, $\frac{5}{2}$.

9. —— ——, var. *tenuis,* n. (p. 436), Rio Boto, $\frac{3}{1}$.

10. *Ampullaria flagellata,* Say, var. *malleata,* Jonas (p. 411), Tabasco.

11. —— ——, var. *guatemalensis,* n. (p. 413), Panzos : 11 *a,* very young specimen.

12. —— ——, var. *tristrami,* Fisch. & Cr. (p. 413), Panzos, obtained by Conradt.

PLATE XXIII.

Fig. 1. *Ampullaria flagellata,* Say (p. 405), Cordova.

2. *Cochliopa trochulus,* n. (p. 429), Rio Grande de Terraba, three views, $\frac{2}{1}$.

3. —— *infundibulum,* n. (p. 429), Guatemala, three views, $\frac{7}{2}$.

4. *Ampullaria flagellata,* Say (p. 405), Cordova, a rather narrow example: 4 *a,* 4 *b,* very young specimens.

5. —— ——, var. *exsculpta,* Fisch. & Cr. (p. 410), Cordova.

6. —— ——, var. *gigantea,* Tristr. (p. 412), Lake of Peten, Tristram's type-specimen.

7. —— ——, var. *arata,* Fisch. & Cr. (p. 410), Cordova.

8. —— ——, specimen intermediate between the var. *exsculpta* and the var. *arata* (p. 410), Cordova, with the sculpture abruptly altered near the beginning of the last whorl.

9. *Cochliopa tryoniana,* Pilsbry (p. 428), Punta Mala, $\frac{2}{1}$: 9 *a,* 9 *b,* view from above and from below; 9 *c,* another more elevated specimen, from the same locality.

10. *Ampullaria flagellata,* Say, var. *arata,* Fisch. & Cr. (p. 410), Costa Rica, specimen given by Van Patten to the Berlin Museum.

PLATE XXIV.

Figs. 1–6. *Ampullaria cerasum*, Hanl. (p. 421), Teapa: 3, young, the others full-grown specimens of different forms, chosen from a large number of shells from the same locality.

7. —— *hondurasensis*, Reeve, var. (p. 420), Lake of Nicaragua, specimen from Dunker's collection.

8. —— *delattrei*, Reeve (p. 419), Lake of Peten, given by Dr. Stoll to the Berlin Museum.

9. —— *yucatanensis*, Cr. & Fisch., var. *yzabalensis*, n. (p. 420), Lake of Yzabal.

10, 11. —— *conoidea*, n. (p. 423), Costa Rica, given by Van Patten to the Berlin Museum, two specimens of somewhat different form.

12, 13. —— *pealeana*, Lea (p. 423), Veraguas, given by Warscewicz to the Berlin Museum, two specimens of somewhat different form.

14. —— *costaricana*, n. (p. 418), Rio Saveyre.

15. —— ——, young specimen, Madre de Dios.

16. —— ——, another young specimen from Costa Rica, obtained by Biolley.

17. —— ——, Palmar.

PLATE XXV.

Fig. 1. *Ampullaria* (*Ceratodes*) *rotula*, Mouss. (p. 425), Costa Rica, obtained by v. Seebach: 1 *a*, 1 *b*, two other views of the same shell.

2, 3. *Pachychilus glaphyrus*, Fisch. & Cr., var. *pyramidalis*, Morel. (p. 445), Panzos, very young specimen.

4. —— *largillierti*, Phil., var. *nodulosus*, n. (p. 451), Paso Antonio.

5. —— *panucula*, Morel., var. *tumidus*, Tristr. (p. 458), Lake of Peten, Tristram's typical specimen.

6. —— *obeliscus*, Reeve, var. *pyrgiscus*, Fisch. & Cr. (p. 447), Lake of Peten.

7. —— *lacustris*, Morel., var. *amphibolus*, Fisch. & Cr. (p. 447), Yzabal.

8. —— ——, var. *major*, Fisch. & Cr. (p. 448), Yzabal.

9. —— ——, var. *conradti*, n. (p. 448), Yzabal.

10. —— ——, ditto, Panzos.

11. —— *subnodosus*, Phil. (p. 450), Costa Rica.

12. —— *largillierti*, Phil. (p. 450), Paso Antonio.

13. —— *subnodosus*, Phil. (p. 450), Managua.

PLATE XXVI.

Fig. 1. *Pachychilus pluristriatus*, Say (p. 449), Laguna de Chapala.

2. —— *largillierti*, Phil. (p. 450), Mirandilla.

3. —— ——, var. *salvini*, Tristr. (p. 451), Rio de la Pasion, one of Tristram's typical specimens.

4. —— *dalli*, Pilsbry (p. 456), Tehuantepec, copied from Pilsbry's figure [Proc. Acad. Phil. 1896, p. 269], to show the peculiar form of the outer lip.

5–9. —— *largillierti*, Phil., var. *stolli*, n. (p. 452), Retalhuleu, specimens of different forms from the same locality.

10–20. —— *turatii*, Villa (p. 454), Atoyac, specimens of different forms chosen from a large number of shells from the same locality: 10 and 11, young; 13, 15, and 16, probably not quite full-grown; 18, 19, and 20, very old.

PLATE XXVII.

Figs. 1, 2. *Pachychilus liebmanni,* Phil. (p. 453), Playa Vicente: 1, adult; 2, not full-grown.
3–5. —— *örstedi,* Mörch (p. 458), Matagalpa, specimens of somewhat different form from the same locality.
6–9. —— *chrysalis,* Brot (p. 457), young specimens from Teapa: 6, very young; 8, nearly full-grown.
10, 11. —— *corvinus,* Morel., var. *indifferens,* Cr. & Fisch. (p. 460), Chiacam: 11 and 11 *a,* very young.
12–14. —— *chrysalis,* Brot, var. *nympha,* n. (p. 457), Rio Sucio, Salvador.
15–18. —— *chrysalis,* Brot (p. 457), full-grown specimens from Teapa: 15 *a,* operculum.

PLATE XXVIII.

[All figures enlarged, the perpendicular line indicates the natural size.]

Fig. 1. *Neritina lineolata,* Lam., specimen intermediate between the var. *reticulata* and the var. *parcepicta* (p. 473), Rio Dulce, $\frac{2}{1}$.
2. —— ——, var. *reclivata,* Say (p. 472), Tampico, $\frac{3}{2}$.
3–5. —— ——, var. *parcepicta,* n. (p. 473), Rio Dulce: probably young, $\frac{5}{2}$; 4 and 5, $\frac{3}{2}$.
6. —— *lineolata,* Lam. (p. 471), Lake of Yzabal, $\frac{3}{2}$.
7. —— ——, var. *reticulata,* Crist. & Jan (p. 473), Lake of Yzabal, $\frac{3}{2}$.
8. —— *picta,* Sow. (p. 589), specimen of normal coloration, Mazatlan, $\frac{5}{2}$.
9. —— *cassiculum,* Sow. (p. 474), Mazatlan, $\frac{3}{2}$: 9 *a,* back view.
10. —— *picta,* Sow. (p. 589), specimen approaching the var. *serta,* Mazatlan, $\frac{5}{2}$.
11, 12. —— *virginea,* L. (p. 588), specimen of normal coloration, Vera Cruz, $\frac{5}{2}$: 12, with rather long white spots below the suture.
13. —— *picta,* Sow., var. *serta,* n. (p. 590), Costa Rica, specimen obtained by v. Seebach, $\frac{5}{2}$.

PLATE XXIX.

Fig. 1. *Unio newcombianus,* Lea (p. 497), Lake of Managua, specimen showing the unequivalve summits: 1 *a,* outside; 1 *b,* right valve inside.
2. —— *stolli,* n. (p. 492), Rio de Las Salinas, outside and inside.

PLATE XXX.

Fig. 1. *Unio semigranosus,* v. d. Busch, var. *testudineus,* Morel. (p. 493), Rio Usumacinta, young specimen: 1 *a,* hinge of the left valve.
2. —— ——, specimen intermediate between the normal form and the var. *testudineus* (p. 494), Tampico: 2 *a* and 2 *b,* hinge of each valve.
3. —— —— (pp. 493, 494), Tampico: 3 *a* and 3 *b,* hinge of each valve.
4. —— ——, an old specimen, locality uncertain: 4 *a* and 4 *b,* hinge of each valve.

PLATE XXXI.

Figs. 1, 2. *Unio psoricus*, Morel. (p. 494), Rio de Las Salinas: 2 *a*, more elongated form; 1 *a*, hinge of the left valve.

3. —— *crocodilorum*, Morel. (p. 495), a specimen from Paetel's collection, now in the Berlin Museum: 3 *a* and 3 *b*, hinge of each valve.

4. —— *corium*, Reeve (p. 495), a specimen from Paetel's collection, now in the Berlin Museum: 4 *a* and 4 *b*, hinge of each valve.

PLATE XXXII.

Fig. 1. *Unio percompressus*, v. Mart. (p. 496), Rio de Las Salinas, a somewhat triangular form: 1 *a*, inside of the right valve.

2. —— ——, a younger specimen from the same locality, hinge of the right, 2 *a*, hinge of the left valve.

3. —— ——, Rio de Las Salinas, a somewhat quadrangular form: 3 *a*, inside of the right valve; 3 *b*, ditto, seen from above.

4, 5. *Dreissena sallei*, Récl. (p. 477), Honduras, two somewhat different specimens, views showing the inside of the right valve, seen from below.

PLATE XXXIII.

Fig. 1. *Unio tampicoensis*, Lea (p. 511), Tampico, from Paetel's collection: 1 *a*, right valve, inside; 1 *b*, hinge of left valve.

2. —— *discus*, var. *panucoensis*, v. d. Busch (p. 510), Panuco, specimen from Dunker's collection: 2 *a*, right valve, inside; 2 *b*, hinge of left valve.

PLATE XXXIV.

Fig. 1. *Unio liebmanni*, Phil. (p. 500), Mexico, specimen sent by Dr. Mörch of Copenhagen to Prof. Dunker: 1 *a*, right valve, inside; 1 *b*, ditto, seen from above.

2. —— *sallei*, Cr. & Fisch., var. *grossus*, n. (p. 517), Rio de Las Salinas: 2 *a*, right valve, inside; 2 *b*, ditto, seen from above.

3. —— *rubicundus*, n. (p. 514), Coban: 3 *a*, left valve, inside.

PLATE XXXV.

Fig. 1. *Unio microdon*, v. Mart. (p. 504), Rio de Las Salinas: 1 *a*, right valve, inside; 1 *b*, hinge of left valve; 1 *c*, ditto, seen from above.

2. —— *alienigenus*, Cr. & Fisch. (p. 513), specimen sent by Dr. Anthony to the Berlin Museum: 2 *a*, right valve, inside.

3–5. —— *tampicoensis*, Lea, var. *umbrosus*, Lea (p. 512), Rio Medellin, three different stages of growth from the same locality: 5 *a*, right valve, inside; 5 *b*, hinge of left valve.

PLATE XXXVI.

Fig. 1. *Unio cuprinus*, Lea, var. *subventralis*, n. (p. 506), Tabasco: 1 *b*, seen from above.
2. —— *aztecorum*, Phil. (p. 502), normal form, Rio de Misantla: 2 *b*, seen from above.
3. —— ——, young specimen, Rio de Misantla.
4. —— ——, large specimen, Playa de Misantla.
5. —— ——, var. *chapalanus* *, n. (p. 504), Laguna de Chapala.
6. —— *tehuantepecensis*, Cr. & Fisch., var. *copanensis*, n. (p. 502), Rio Copan.

a, right valve, inside.

PLATE XXXVII.

Fig. 1. *Unio aztecorum*, Phil., var. *strebeli*, Lea (p. 503), Playa de Misantla, full-grown specimen from Strebel's collection.
2. —— ——, ditto, younger specimen from the same locality.
3. —— —— (p. 502), Playa de Misantla, very old specimen: 3 *b*, seen from above.

a, right valve, inside.

PLATE XXXVIII.

Fig. 1. *Unio ravistellus*, Morel., var. *veræ-pacis*, Tristr. (p. 516), Vera Paz, Tristram's type-specimen.
2–6. —— —— (p. 516), Lake of Yzabal, different forms chosen from a large number of shells collected by Dr. O. Stoll: 5 *a*, younger, 6 *a*, less worn, specimen.
7, 8. —— *guatemalanus*, n. (p. 519), Paso Antonio, two specimens of somewhat different form: 7 *b*, 8 *b*, seen from above.
9. —— *championi*, n. (p. 508), Paso Antonio.
10. —— *goascoranensis*, Lea (p. 501), Paso Antonio: 10 *b*, seen from above.
11. —— *hjalmarsoni*, n. (p. 509), Rio Chamelicon.

a, right valve, inside.

PLATE XXXIX.

Figs. 1, 2. *Unio aratus*, Lea (p. 499), Lake of Managua, specimen given by Dr. O. Stoll to the Berlin Museum (this locality is omitted in the text): 2 *b*, seen from above.
3. —— ——, specimen given by Largilliert to the Berlin Museum: 3 *b*, seen from above.
4. —— *pliciferus*, Lea, var. *minor*, Fisch. & Cr. (p. 515), Rio Medellin, collected by Strebel.

a, right valve, inside.

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* Incorrectly named *U. aztecorum*, var. *chapalensis*, on the Plate.

Fig. 5. *Unio gabbianus*, Lea (p. 498), Lake of Nicaragua: 5 *b*, seen from above, showing the unequivalve summits.

6. —— *nuculinus*, Phil. (p. 509), Nicaragua, specimen from Dunker's collection, given probably by Philippi himself to the Berlin Museum: 6 *b*, seen from above.

7. —— *medellinus*, Lea (p. 517), Rio Medellin, obtained by H. H. Smith: 7 *b*, seen from above.

8. —— *radiatulus*, n. (p. 518), Paso Antonio: 8 *b*, seen from above.

9–11. —— *yzabalensis*, Cr. & Fisch. (p. 507), Panzos, three different forms selected from a large number of shells collected by Conradt.

a, right valve, inside.

PLATE XL.

Figs. 1–7. *Anodonta coarctata*, Anton (p. 525), Lake of Chapala, different stages and forms obtained by Richardson at the same locality: 1, hinge and sinulus of right valve; 2, summits of a young specimen, $\frac{2}{1}$, showing the folds; 3, nearly full-grown; 4 and 5, young; 6, normal, *a*, seen from above; 7, rather abnormal example.

8–11. —— *exilior*, Lea (p. 530), Vera Cruz, different forms selected from a large number of shells collected by F. D. Godman: 10 *a*, hinge and sinulus of right valve; 10 *b*, seen from above.

PLATE XLI.

Figs. 1, 2. *Anodonta richardsoni*, n. (p. 529), Ameca: 1, young; 1 *b*, summits of the same, enlarged, showing the undulated folds; 2, full-grown; 2 *a*, right valve, inside.

3. —— (*Pachyanodon*) *depexa*, n. (p. 538), Paso Antonio: 3 *a*, right valve, inside; 3 *b*, seen from above.

4. —— (*Pseudoleila*) *ciconia*, A. Gould (p. 536), Mazatlan, right valve, inside, showing the oblique scratches, mentioned on p. 537.

5. *Mycetopus subsinuatus*, Sow. (p. 540), Paso Antonio: 5 *a*, right valve, inside.

PLATE XLII.

Figs. 1–3. *Polymesoda mexicana*, Brod. (p. 548), Mazatlan: 1 and 3, younger specimens; 2, full-grown; 1 *a*, 2 *b*, and 3 *a*, seen from above; 2 *a*, right valve, inside, showing the pallial sinus.

4, 5. —— *placens*, Hanl. (p. 545), Livingston: 4 *a* and 5 *a*, right valve, inside; 4 *b* and 5 *b*, seen from above.

6. —— *olivacea*, Carp. (p. 541), Mazatlan, young specimen: 6 *a*, seen from above.

7. —— *cordata*, Wiegm. (p. 546), Mexico, type-specimen in the Berlin Museum: 7 *a*, right valve, inside; 7 *b*, seen from above.

8, 9. —— *solida*, Phil. (p. 544), Nicaragua, specimens from Dunker's collection: 8 *a* and 9 *a*, right valve, inside; 8 *b* and 9 *b*, seen from above.

PLATE XLIII.

Fig. 1. *Sphærium costaricanum*, n. (p. 552), Alajuela, $\frac{3}{1}$: 1 *a*, right valve, inside; 1 *b*, seen from above.

2. —— *luridum*, n. (p. 552), Ameca, $\frac{2}{1}$: 2 *b*, young specimen; 2 *c*, seen from above.

3. —— *martensi*, Pilsbry (p. 552), Lake Patzcuaro, specimen received from Pilsbry, natural size.

4. *Eupera pittieri*, n. (p. 553), Sierpe, $\frac{3}{1}$.

5. *Pisidium abditum*, Haldem. (p. 554), Cartago, $\frac{7}{2}$.

} *a*, right valve, inside; *b*, seen from above; the upper sketch indicates the natural size.

6. *Unio imbricatus*, Mörch (p. 498), Nicaragua, Mörch's type-specimen belonging to the Museum of Copenhagen: 6 *a*, right valve, inside; 6 *b*, seen from above.

7. *Melampus trilineatus*, C. B. Ad. (p. 559), Punta Arenas, $\frac{3}{2}$.

8. —— *tabogensis*, C. B. Ad. (p. 560), Panama, $\frac{2}{1}$.

9. —— *strigosus*, n. (p. 560), Rio Boto, $\frac{5}{2}$.

10. —— *panamensis*, C. B. Ad. (p. 561), Panama: 10 *a*, another somewhat narrower specimen, both $\frac{5}{2}$.

11. —— *bocoronicus*, Mörch (p. 560), Punta Arenas, obtained by Biolley, $\frac{3}{2}$.

12. *Littorina philippii*, Carp. (p. 584), Mazatlan, obtained by Ringe, $\frac{7}{2}$.

13. —— ——, var. *alba*, n. (p. 585), Mazatlan, $\frac{7}{2}$.

14. —— ——, var. *penicillata*, Carp. (p. 584), Mazatlan, obtained by Forrer, $\frac{7}{2}$.

15. —— *aspera*, Phil. (p. 587), Salvador, specimen from Paetel's collection, $\frac{2}{1}$.

16. —— ——, young specimen from Nicoya, $\frac{4}{1}$.

17. —— *philippii*, Carp., var. *subsuturalis*, n. (p. 585), San José, Guatemala, $\frac{5}{2}$.

18. —— ——, var. *latistrigata*, n. (p. 585), Punta Arenas, $\frac{5}{2}$.

[The vertical lines placed near figg. 7–18 indicate the natural size.]

PLATE XLIV.

Fig. 1. *Salasiella elegans*, v. Mart. (p. 613), Colima: 1 *b*, another specimen, both $\frac{5}{2}$.

2. *Guppya angasi*, Tryon (pp. 120, 619), Alta Talamanca, two views, $\frac{5}{2}$.

3. —— *micans*, Ang. (pp. 121, 620), Bruschik, two views, $\frac{3}{1}$.

4. *Streptostyla sargi*, Fisch. & Cr., var. *championi*, n. (p. 617), Sabo, $\frac{2}{1}$.

5. *Glandina pittieri*, n. (p. 611), Talamanca.

6. *Streptostyla* (*Pittieria*, n.) *bicolor*, n. (p. 617), Alta Talamanca.

7. *Semisinus maculatus* *, Lea (p. 646), Rio Tararia, $\frac{2}{1}$.

8. *Pachychilus* (*Potamanax*) *pilsbryi*, n. (pp. 463, 646), Santa Gertrudis.

9. *Otostomus colimensis*, Rolle (p. 630), Colima, Rolle's typical specimen.

[10. *Tornatellina pittieri*, v. Mart. (p. 640), Cocos Island, type-specimen obtained by H. Pittier, two views, $\frac{2}{1}$.]

11. *Potamides* (*Cerithidea*) *costatus*, DaCosta (p. 572), Progreso, $\frac{3}{1}$: 11 *a*, operculum.

[12. *Succinea globispira*, v. Mart. (p. 641), Cocos Island, type-specimen, two views, $\frac{2}{1}$.]

13. *Amnicola vulcani*, n. (p. 645), Lake of Atitlan, $\frac{2}{1}$.

14. —— *stolli*, n. (p. 645), Antigua, $\frac{5}{2}$.

15. *Ortalichus princeps*, Sow., var. *elegans*, Rolle (p. 629), Colima, Rolle's type-specimen.

16. —— *zoniferus*, Streb., var. *nobilis*, Rolle (p. 629), Colima, Rolle's type-specimen.

17. *Pachychilus largillierti*, Phil. (pp. 450, 645), Amatitlan, living animal from a drawing made by Dr. O. Stoll.

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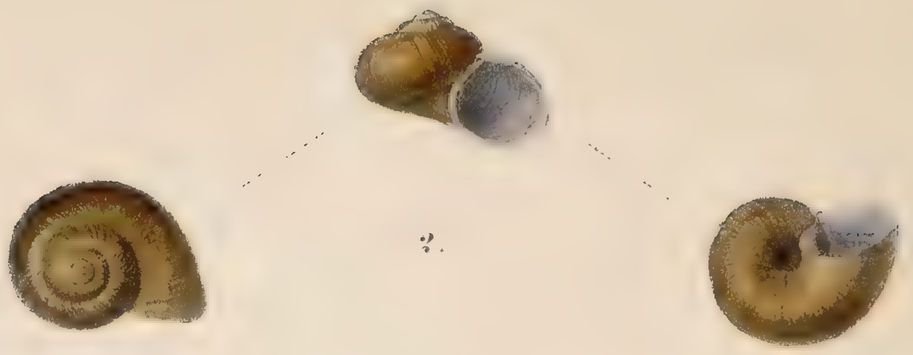
* Named *Hemisinus maculatus* on the Plate.

1.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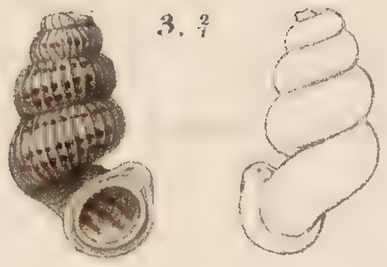

3. 2/1

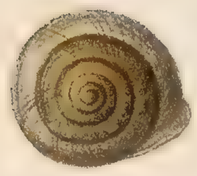
4. 3/2

5. 3/4

19 a

19 b.

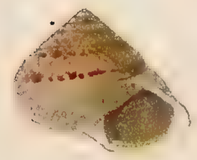
6. 3/2

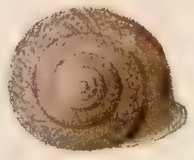


a

b.

7.





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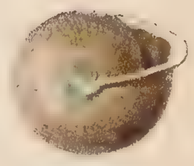


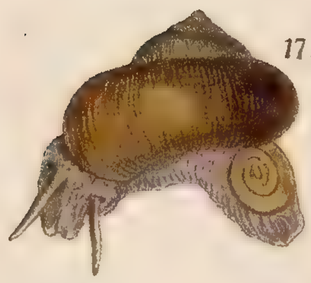
10.

a

b

9.

c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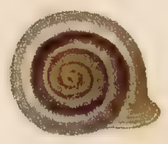

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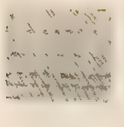
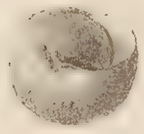
14. 3/1


12. 3/2



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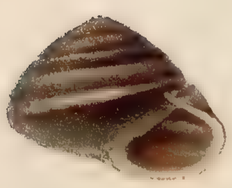
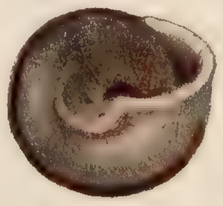
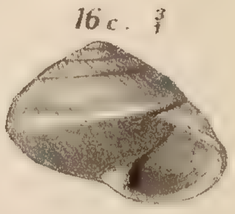


16 a. 3/1



16 b. 3/1


16 c. 3/1

1. CYCLOTUS DYSONI VAR. AFFINIS.
2. „ „ „ MINOR.
3. CHOANOPOMA RIGIDUTUM.
4. CHONDROPOMA ANDREWSAE.
5. „ SUBANGULATUM.
6. HELICINA SUCCINCTA.
7. HELICINA DEPPEANA.
8. „ „ VAR.
9. „ SUCCINCTA VAR.
10. „ PUNCTISULCATA.
11. „ ANOZONA.
12. „ OWENIANA.
13. „ CHRYSOCHEILA.
14. HELICINA CHRYSEIS.
15. „ BOREALIS.
16. „ DYSONI VAR. JANSONI.
17. CYCLOTUS DYSONI, AN.
18. HELICINA LIRATA, AN.
19. DIPLOMMATINA STOLLI.

E. Duval, Berlin, lith.

Printed by A. Renaud, Berlin.

1

2b

3

1a

2a

2c

4b.

3a

3c.

3b.

4c

2

4a.

4

1, 1a GLANDINA INDUSIATA.
2, 2a-c „ VANUXEMI.
3, 3a-c GLANDINA SOWERBYANA.
4, 4a-c „ COULTERI.

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1

1 a

1 b

1 c.

2

2 a

5 a.

5

3

4

6 a.

6

7 a

9 a.

7

8

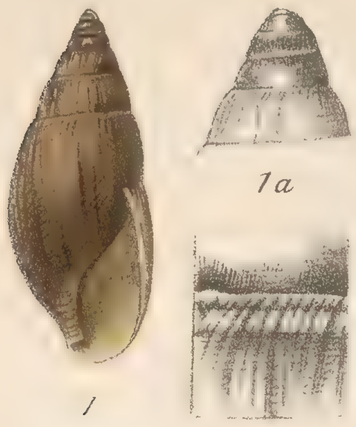
9

10

1, 1 a-c, 2, 2 a GLANDINA CUNEUS.
3, 4 „ LIEBMANNI.
5, 5 a, 6, 6 a „ AUDEBARDI.
7, 7 a GLANDINA AUDEBARDI, *v.* AMŒNA.
8 „ „ , *v.* MINOR.
9, 9 a, 10 „ LONGULA, *v.* JALAPANA.

Eug. Duval del

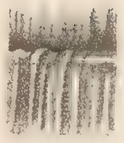
Cambridge Engraving Company.


1

1a

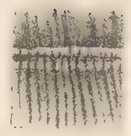
1b

2


2a

3

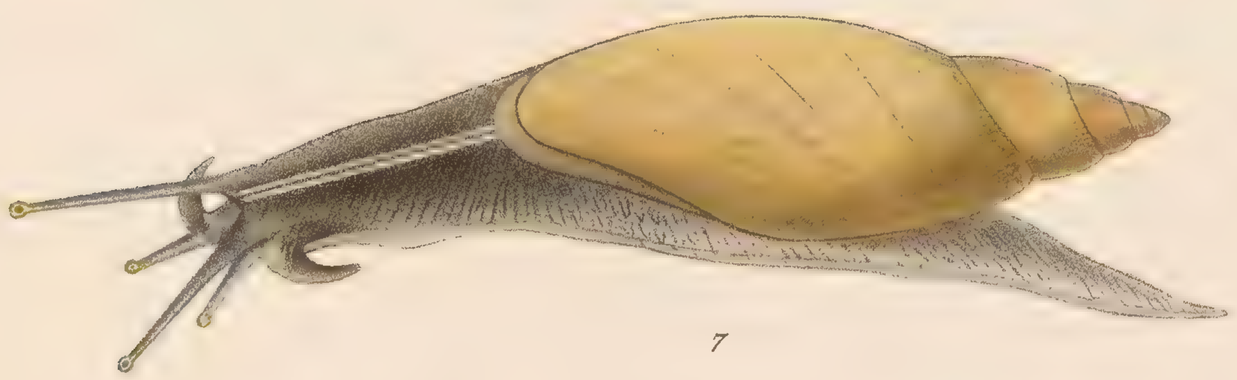
4


4a

5

5a

6


7

8

9

9a

10

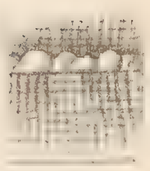
10a

11

12

13

14a.


14b

14

14c.

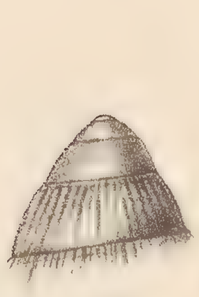
14d.

15

16

17

18


20a

19

20

1, 1 a,b	GLANDINA	LANCEOLATA.	6	GLANDINA	SIMPLEX, *v.* CANDIDA.	11	GLANDINA	ALBERSI, *v.* INFLATA.
2, 2 a	„	MAZATLANICA.	7	„	CUMINGI, *v.* FLAVIDA.	12,13	„	DECIDUA.
3	„	„ , *v.* ABBREVIATA.	8	„	CONULARIS.	14,14 a-d,15	„	LARGILLIERTI.
4, 4 a	„	PSEUDOTURRIS.	9, 9 a	„	EXCAVATA.	16	„	TURGIDA.
5, 5 a	„	SIMPLEX.	10,10 a	„	ALBERSI.	17-20 a	„	„ , *v.* SAYULANA.

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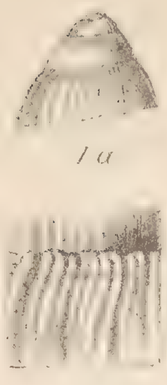
1


1a 1b.

2

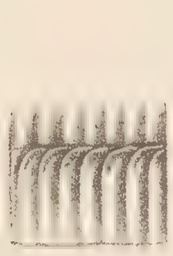
2a 2b.

3

3a

4

5


5a.

6

6a 6b.

7

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11

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12a.

13

14

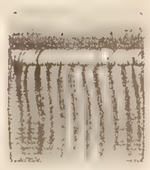
15

16

17

17a

18


18a.

19

20

21

21a.

22

23

24

25

26

1, 1a,b	GLANDINA SULCIFERA.	9	SALASIELLA PULCHELLA.	18,18a	STREPTOSTYLA DELIBUTA.
2, 2a,b	„ FILOSA	10	STREPTOSTYLA DUBIA.	19	„ FLAVESCENS, *v.* BOUCARDI.
3, 3a	„ FISCHERI.	11	„ BULLACEA.	20	„ VENTRICOSULA.
4	„ DELICATULA.	12,12a	„ OBESA.	21,21a	„ „ , *v.* BINNEYANA.
5, 5a	„ „ , *v.* MAJOR.	13	„ CYLINDRACEA.	22,23	„ SOLOLENSIS.
6, 6a,b	„ OBLONGA.	14	„ CONIFORMIS.	24	„ LIMNÆIFORMIS, *v.* PARVULA.
7	„ NANA.	15	„ CONULUS.	25	„ MERIDANA.
8	SALASIELLA MARGARITACEA.	16	„ LABIDA.	26	„ „ , *v.* COBANENSIS.
		17,17a	„ BICONICA.		

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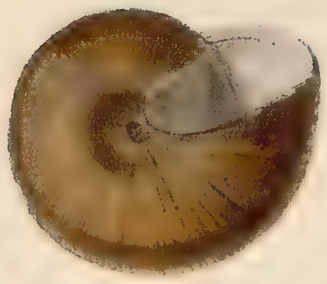
1a

1b


1c

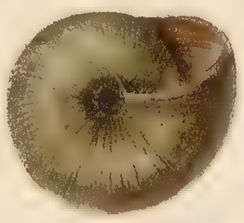
2a

2b

3

4

4a


4b

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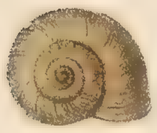
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7

7a

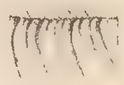
7b

8

8a

8c 4/1

8b


9d 4/1

9 2/1

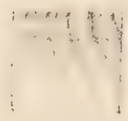
9a

9c

9b

10

10a


10c 4/1

10b

11 2/1

11a

11c

11b

12 2/1

12a

12c

12b

13 3/1

13a

13c

13b

14 2/1

14a

14b

14c

15 4/1

15a

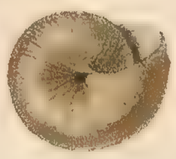
15c

15b

16 2/1

16a

16c

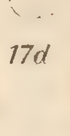

16b

17 2/1

17a

17b

17c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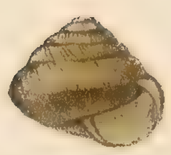
18 4/1

18b

18d

18a

18c

19 4/1

19a

19d

19b

19c

20 4/1

20a

20d

20b

20c

1, 1 a, b OMPHALINA LUCUBRATA.
2, 2 a, 3 ,, ,,
4, 4 a, b ,, ,, v. DEPPEANA.
5 ,, ,,
6 ,, BILINEATA, v. APICALIS.
7, 7 a, b ,, MODESTA.
8, 8 a, b OMPHALINA VERACRUZENSIS.
9, 9 a-c HYALINIA NITIDOPSIS.
10, 10 a, b OMPHALINA SCULPTA.
11, 11 a-c HYALINIA HOFFMANNI.
12, 12 a-c ,, PAUCILIRATA.
13, 13 a-c ,, ARBOREA.
14, 14 a-d ,, GLOMERULA.
15, 15 a-c HYALINIA STOLLI.
16, 16 a-c GUPPYA CHAMPIONI.
17, 17 a-d ,, TROCHULINA.
18, 18 a-d ,, PITTIERI.
19, 19 a-d ,, BIOLLEYI.
20, 20 a-d ,, OROSCIANA.

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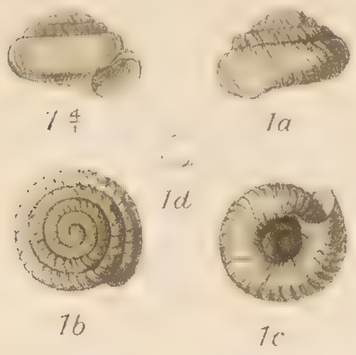
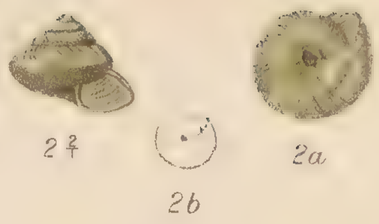
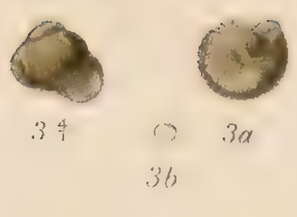
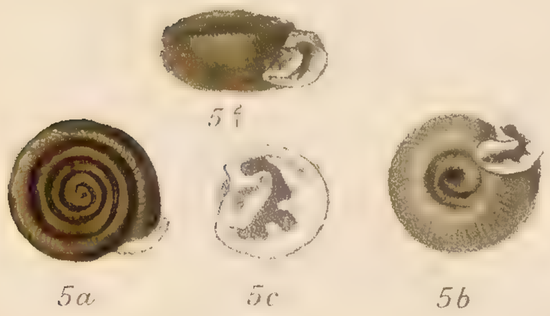

1 a-d


2, 2a, 2b


3, 3a, 3b

4, 4a, 4b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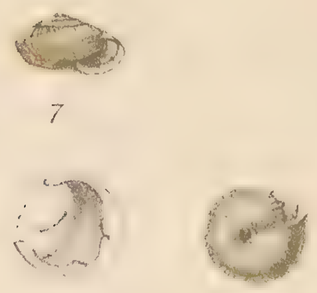
6, 6a, 6b, 6c, 6d


7, 7a, 7b, 7c

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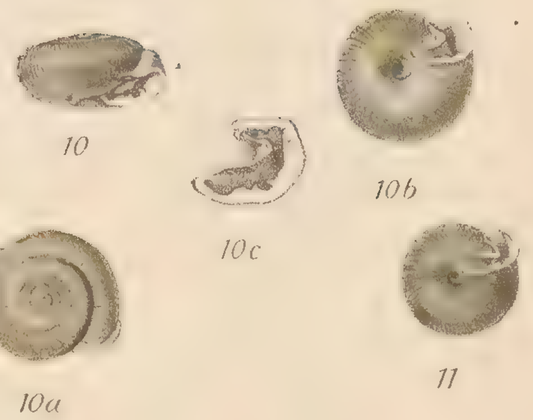
8, 8a, 8b, 8c

9, 9a, 9b, 9c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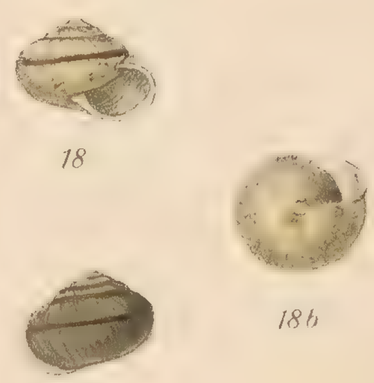
12, 12a, 12b, 13, 14

19


18, 18a, 18b, 18c

15, 15a, 16, 16a, 17

20

18d, 18e

22

21

22a

1, 1 a-d PSEUDOHYALINA CIDARISCUS.
2, 2 a,b PATULA TURBINELLA.
3, 3 a,b HELIX PUNCTUM.
4, 4 a,b „ SUTURALIS, *v.* PRESSULA.
5, 5 a-c POLYGYRA IMPLICATA.
6, 6 a-d POLYGYRA COULONI.
7, 7 a-c „ DISSECTA
8, 8 a-c „ BICRURIS.
9, 9 a-c „ RICHARDSONI.
10, 10 a-c, 11 „ VENTROSULA.
12, 12 a,b, 13, 14 HELIX BERLANDIERIANA.
15, 15 a, 16, 16 a, 17 „ „ GRISEOLA.
18, 18 a-e „ FLAVESCENS
19, „ ASPERSA.
20, 21, 22, 22 a „ HUMBOLDTIANA.

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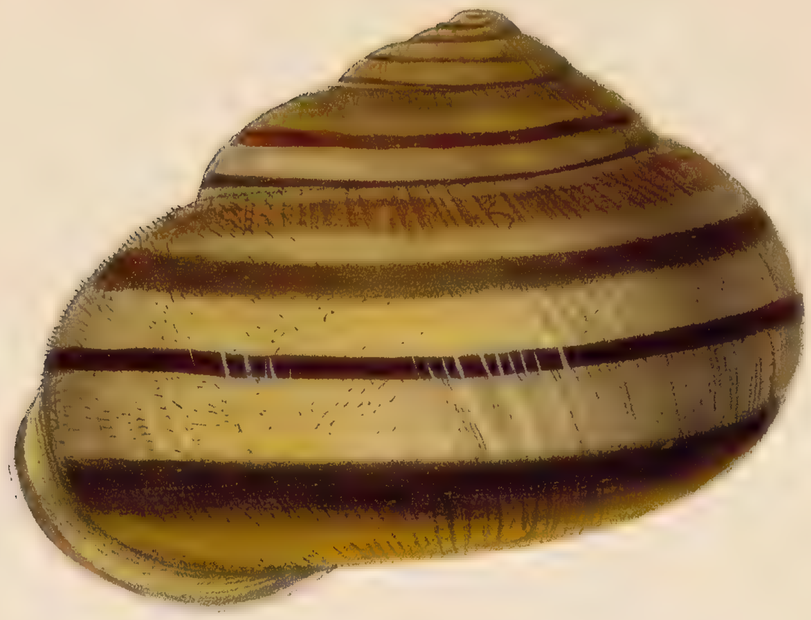
1



1a

1d $\frac{4}{1}$

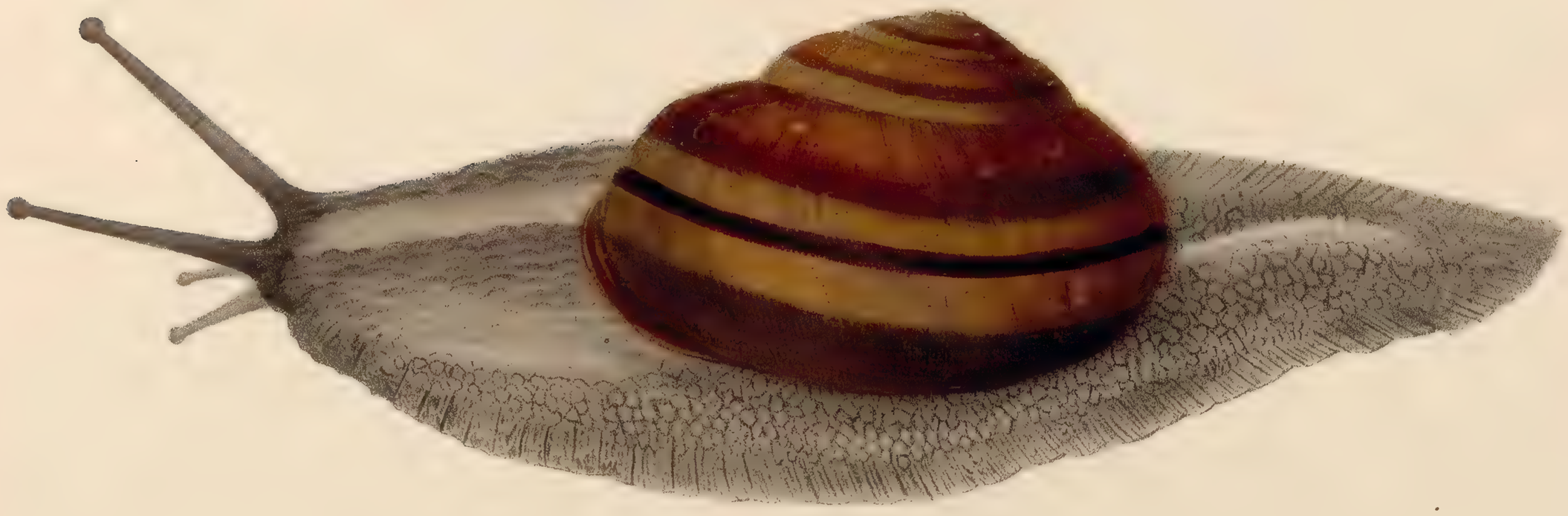
2

1c $\frac{3}{1}$

1b

3

3a $\frac{1}{6}$



4

1, 1a-d HELIX GHIESBREGHTI, *v.* SUBAURANTIA. 2 HELIX GHIESBREGHTI, *v.* STRUBELLI.
3, 3a, 4 HELIX GHIESBREGHTI, *typica*.

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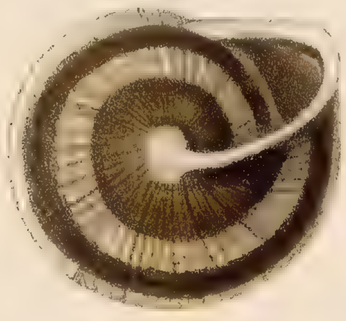
1

2

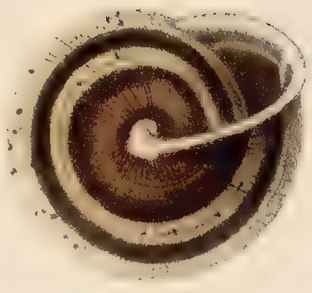
3

4

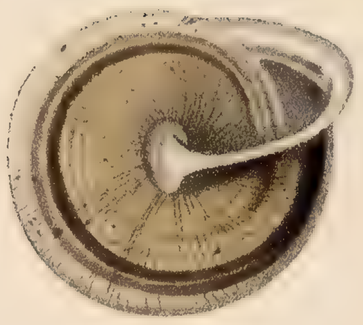
1a



2a



3a



4a

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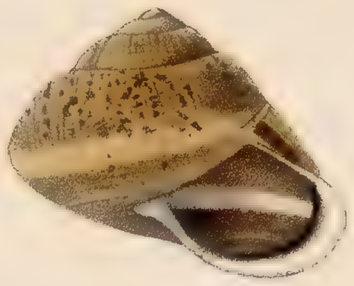
6



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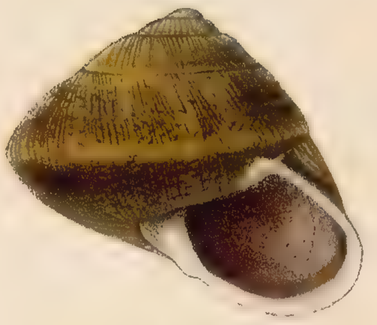

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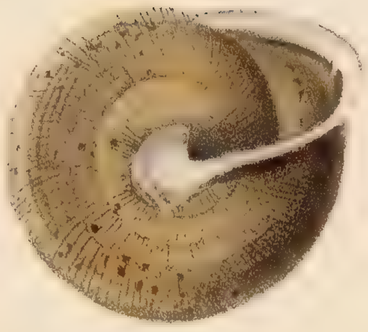
5a



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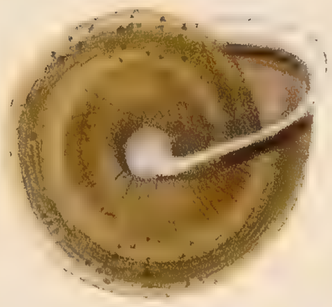

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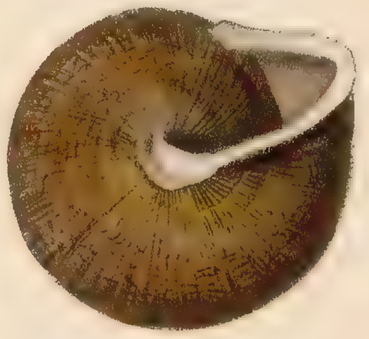

8a

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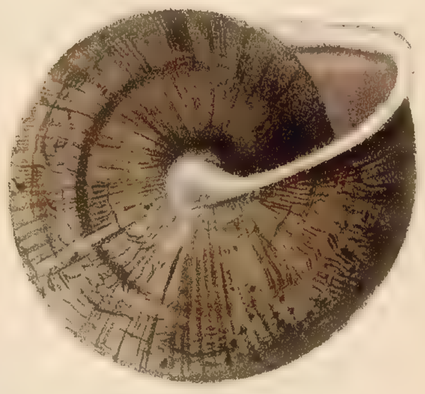
10a



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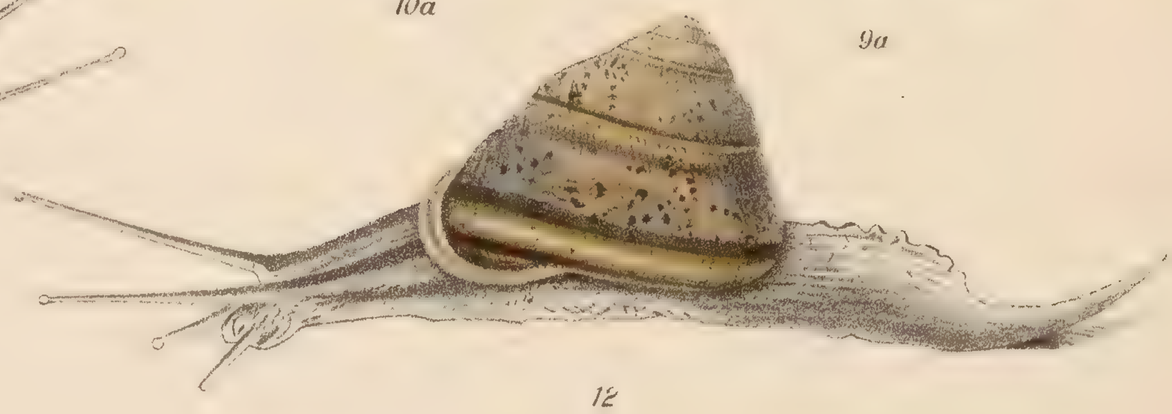


12

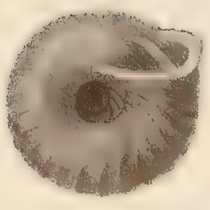
1, 1a	HELIX	TRIGONOSTOMA, *v.*	INTERMEDIA.	6, 6a	HELIX	TRIGONOSTOMA, *v.*	STOLLIANA.
2, 2a	„	„	„ *v.* STOLLIANA.	7, 7a	„	„	„
3, 3a	„	„	„	8, 8a, 9, 9a	„	„	„ *v.* FREYTAGIANA.
4, 4a	„	„	„	10, 10a, b	„	ALTISPIRA.	
5, 5a	„	„	„	11, 12	„	TRIGONOSTOMA, *v.*	STOLLIANA, *anim.*

Eug. Duval del.

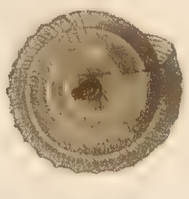
Cambridge Engraving Company.

1

1a



1b



1c

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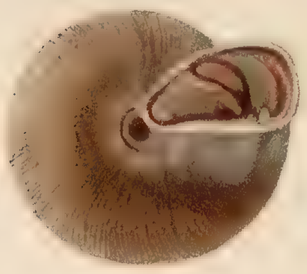

2a

2b

2c

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3a

3b

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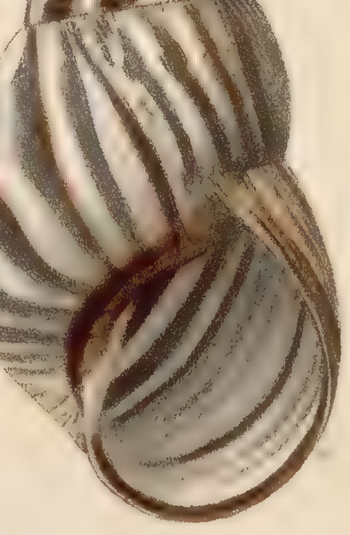
11a



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13

1, 1a-c STROBILA SALVINI.
2, 2a-c LABYRINTHUS TRIPLICATUS.
3, 3a, b ORTALICHUS PRINCEPS.
4-6 ORTALICHUS PRINCEPS.
7 „ „ „ v. FISCHERI.
8-10 ORTALICHUS FERUSSACI.
11, 11a „ LIVIDUS.
12, 13 „ ZONIFERUS.

Eug. Duval del.

Edwin Wilson. Cambridge.

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1-3	ORTALICHUS	MACLURÆ.
4,5	„	BOUCARDI.
6,7,7a	„	MELANOCHILUS.
8	ORTALICHUS	TRICINCTUS.
9,10,10a	„	PONDEROSUS.
11	„	BOUCARDI, *var.*

Eug. Duval del.

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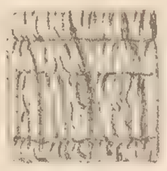
1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1a

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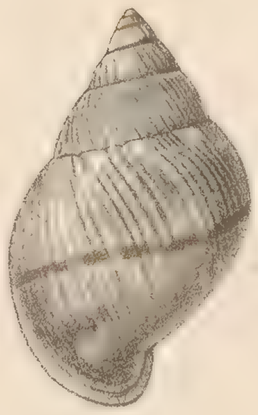
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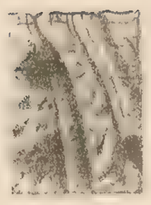
3b

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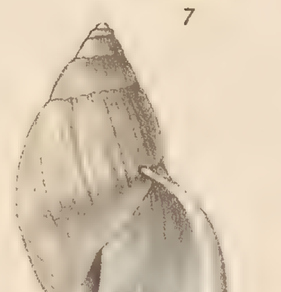
13

13a

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11b

11a

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14b

14a

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16a

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21

1,1a,b OTOSTOMUS FENESTRATUS.
2,2a „ DOMBEYANUS, *juv.*
3,3a,b „ LILACINUS, *v.* JANSONI.
4 „ „ *v.* UNDULOSUS.
5 „ „ *v.* ICTERICUS.
6 OTOSTOMUS LILACINUS, *v.* UNICOLOR.
7 „ JOSEPHUS, *v.* MACULOSUS.
8-10 „ „ *v.* CONCOLOR.
11,11a,b,12 „ DELATTREI.
13,13a „ „ *v.* HIABUNDUS.
14,14a,b OTOSTOMUS DELATTREI, *v.* HIABUNDUS.
15 „ CHIAPENSIS, *v.* 4-FASCIATUS.
16,16a „ CASTUS, *v.* XANTHOLEUCUS.
17-19 „ „
20,21 „ „ *v.* PORRECTUS.

Eug. Duval del.

Edwin Wilson. Cambridge.

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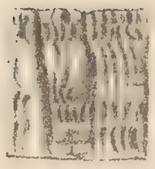

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16b

16a

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17a

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1	OTOSTOMUS	DUNKERI.	9	OTOSTOMUS	GHIESBREGHTI, *v.*	INTERSTITIALIS.	15,15a,b	OTOSTOMUS ATTENUATUS.
2,2a	„	„ *v.* FORRERI.	10	„	„	*v.* STOLLI.	16,16a,b	„ „ *v* VARICOSUS.
3,3a,4	„	SULCOSUS.	11-13	„	JONASI.		17,17a	„ TRIMARIANUS.
5,5a	„	GHIESBREGHTI.	14	„	HEGEWISCHI, *var.*		18-20	„ HEPATOSTOMUS.
6-8	„	„ *v* STOLLI.					21,21a	„ BUCABENSIS.

Eug Duval del.

Dawson Wilson, Cambridge

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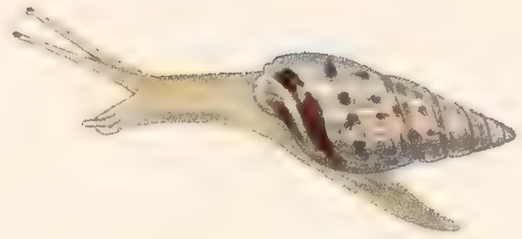

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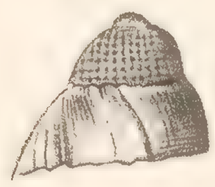
9a



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1,1a OTOSTOMUS INGLORIUS, *v.* HEYNEMANNI.
2,2a „ SARGI, *v.* MOTAGUÆ.
3 „ MACULATUS.
4,4a „ INGLORIUS, *v.* HEYNEMANNI.
5 „ CHAMPIONI.
6,6a „ EMEUS.

Eug Duval del.

7, 7a OTOSTOMUS EMEUS.
„ „, *v.* ALBIVARICOSUS.
8, 8a „ MORITINCTUS.
9, 9a,b „ „
10,10a „ TRIPICTUS, *v.* HOFFMANNI.
11,11a „

12,12a OTOSTOMUS IRAZUENSIS, *var.* c.
13,13a „ „ „, *var.* b.
14,15 „ SULFUREUS.
16,17 „ „ „, *v.* CITRONELLUS.
18 „ „ „, *v.* OBESUS
19,20 „ LILIACEUS

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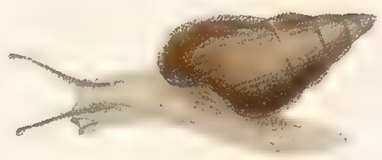

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24a

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1,1a,2,3 OTOSTOMUS UHDEANUS.
4 „ ,v. CUERNAVACENSIS.
5 „ ,v. TEPICENSIS.
6 „ ,v. BOREALIS.

7,7a,8 OTOSTOMUS LIVESCENS.
9 BULIMULUS CORNEUS.
10 OTOSTOMUS SEMPELLUCIDUS.

11,11a BULIMULUS DURANGOANUS.
12-23 „ SCHIEDEANUS.
24,24a,b „ ALTERNATUS.
25,26 „ „

Eug Duval del. Edwin Wilson. Cambridge

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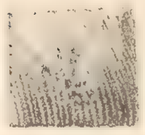
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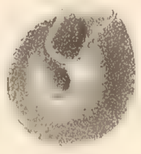
4c

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26a

26b

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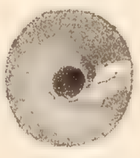
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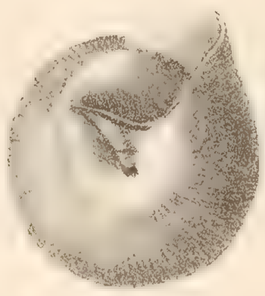
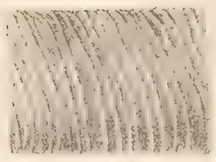

28b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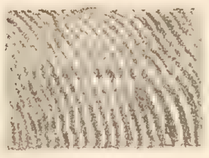
29a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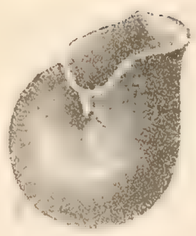
29b

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33a

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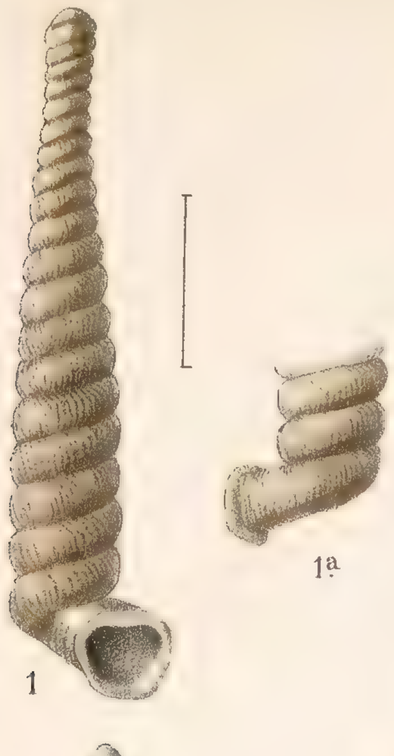
1	OTOSTOMUS ATTENUATUS, VAR PITTIERI.	17	HOLOSPIRA TERES VAR HOEGEANA	26-26c	COELOCENTRUM CHAMPIONI
2	COELOCENTRUM CLAVA, VAR. RUFESCENS	18	„ PFEIFFERI, VAR. MINIMA	27-28c	„ GIGAS.
3-9	EUCALODIUM TRUNCATUM	19-24	„ FUSCA	29-30	„ CLATHRATUM
10-16	HOLOSPIRA CLAVIFORMIS	25	„ IMBRICATA	31-34	EUCALODIUM STREBELI.

von Zglinicka ad nat. del. et lith.

Wilhelm Greve, Berlin.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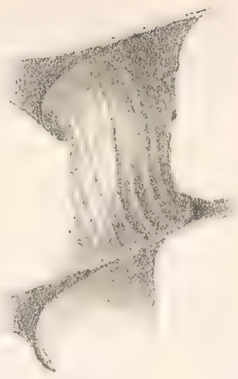
1a


1b

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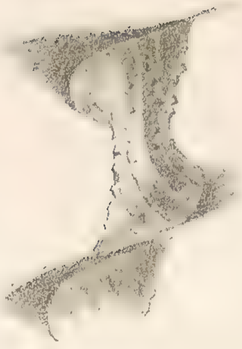
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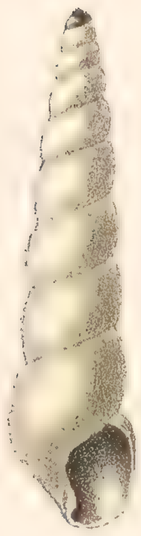
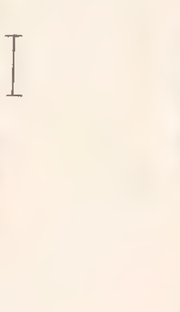

13

13a

13b

14

14a


14b

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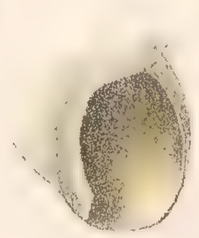
15a

15b

16

16a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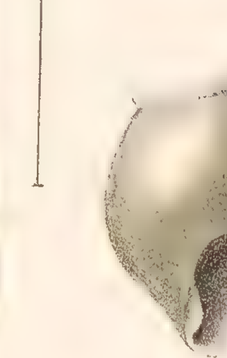
17a

17


17b

18a

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18b

19.

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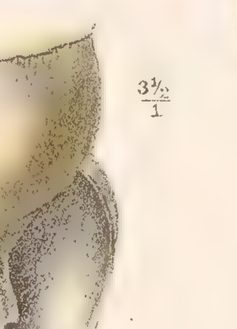
20a


20b

21a

21

21b

1,1a,b. HOLOSPIRA POLYGYRELLA
2 MACROCERAMUS CONCISUS v. MEXICANUS
3,3a HOLOSPIRA MORINI v. PULCHELLA
4 " APIOSTOMA
5 " MORINI v. SALPINX
6 OPEAS BOCOURTIANUM v. PITTIERI
7 " GUATEMALENSE v MAJUS
8 OPEAS GLADIOLUS
9 " OCTONOIDES
10 " MICRA
11 " " V. CARACASENSE
12 " TRYONIANUM v. SUBOVALE
13,13 a,b SUBULINA TROCHLEA
14,14 a,b " PORRECTA
15,15 a,b SUBULINA STOLLI
16,16 a,b PSEUDOSUBULINA TRYPANODES
17,17 a,b " FORTIS
18,18 a,b " MITESCENS
19 " ROBUSTA
20,20 a,b " LIRIFERA
21,21 a,b " SALVINI

von Zglinicka ad nat. del et lith. impr. O. Hollmann.

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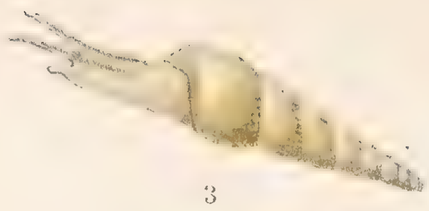

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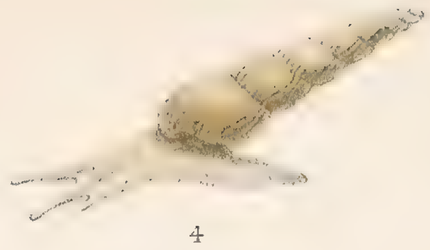

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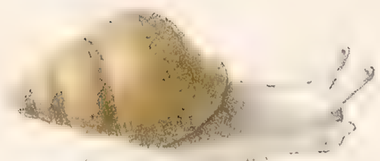

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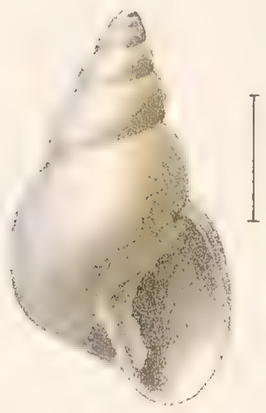

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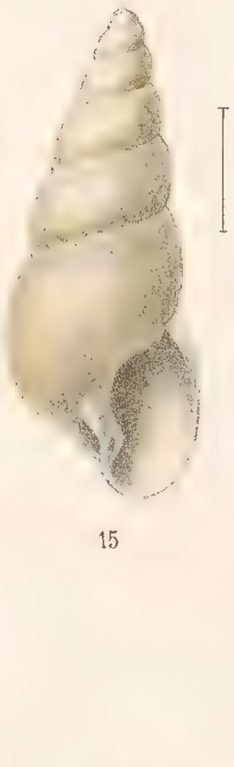

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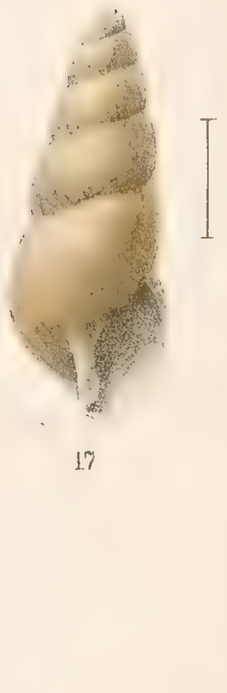

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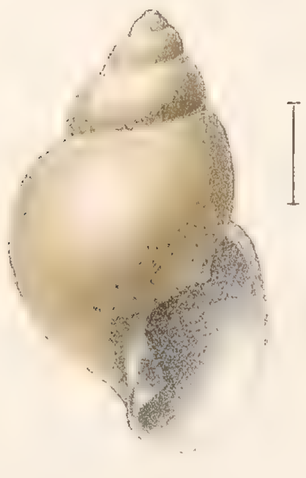

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1	SPIRAXIS NITIDUS v. MAJOR	8	LEPTINARIA PITTIERI v. OBLIQUATA	15	LEPTINARIA	COSTARICANA
2	» » v. PITTIERI	9,9a	» STOLLI	16	»	HAPALOIDES
3	OPEAS SUBULA	10	» EXIGUA	17	»	AMBIGUA
4	SPIRAXIS SULCIFERUS	11	» SINISTRA	18	»	SOLIDA
5	» SCALELLA	12	» CRENULATA	19	»	ELISAE
6	TORNAXIS SINGULARIS	13	» GUATEMALENSIS v. MAJUSCULA	20,20a	»	CONVOLUTA
7	LEPTINARIA PITTIERI	14	» BIOLLEYI	21		EMMELINAE

von Zglinicka ad nat. del et lith.

impr. O. Hollmann

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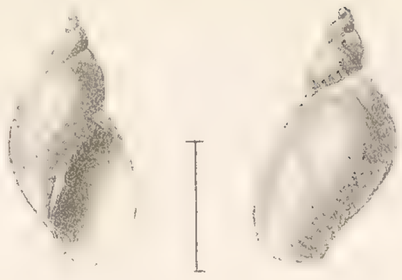

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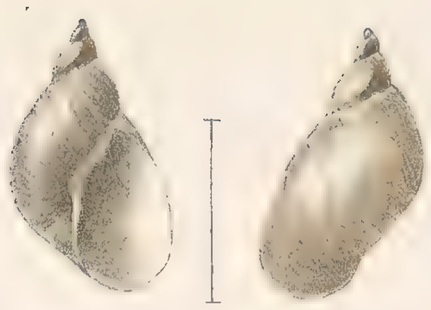

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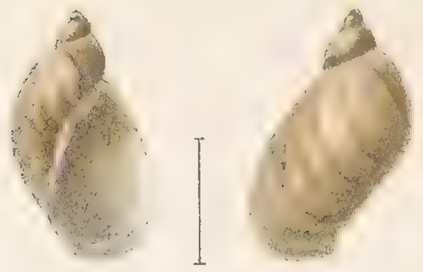

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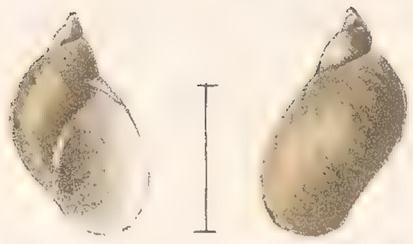

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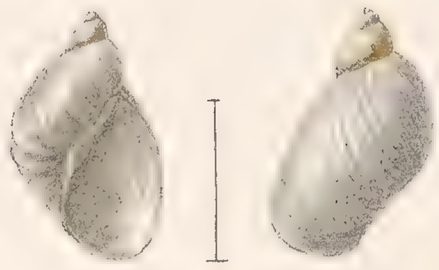

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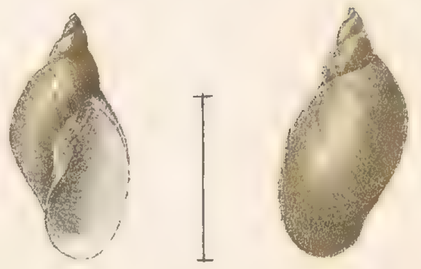

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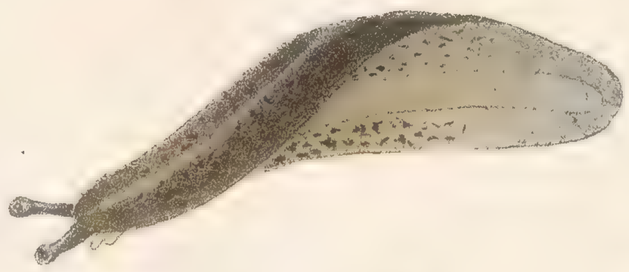

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21 22

1 PUPOIDES MARGINATUS.
2 SUCCINEA LUTEOLA var. SUBTILIS.
3 " " var. RADIUSCULA.
4 " VIRGATA.
5 " " var. HOEGEANA.
6 " COSTARICANA.
7 SUCCINEA BREVIS.
8 " UNDULATA var. MOERCHI.
9 " GUATEMALENSIS.
10 " UNDULATA.
11 " AMPULLACEA.
12 LIMNAEA CHAMPIONI.
13, 14 VERONICELLA STOLLI.
15, 16 CARYCHIUM EXIGUUM var. MEXICANUM.
17, 18 " " var. COSTARICANUM.
19 PHYSA NITENS.
20 " MAUGERAE.
21, 22 " PRINCEPS var. PALLENS.

von Zglinicka ad nat. del. et lith.

Impr. O. Hollmann

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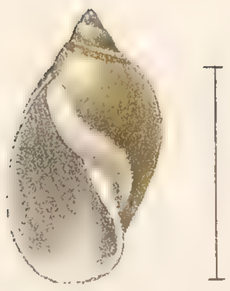

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1 PHYSA IMPLUVIATA.
2, 3 „ „ var. LAETA.
4, 4a „ NICARAGUANA.
5, 5a, 6 „ FULIGINEA var. HOFFMANNI.
7, 7a PHYSA OBTUSA.
8 „ PANAMENSIS.
9, 10 „ CISTERNINA var. MINOR.
11, 11a, 12 „ FULIGINEA var. PLICULOSA.
13 „ OSCULANS var. MEXICANA.
14, 15 PHYSA POLAKOWSKYI.
16 „ BERENDTI var. MINIMA.
17 „ OSCULANS var. CONIFORMIS.
18 „ „ „ BOUCARDI.

von Zglinicka ad nat. del. et lith.

impr. O. Hollmann.

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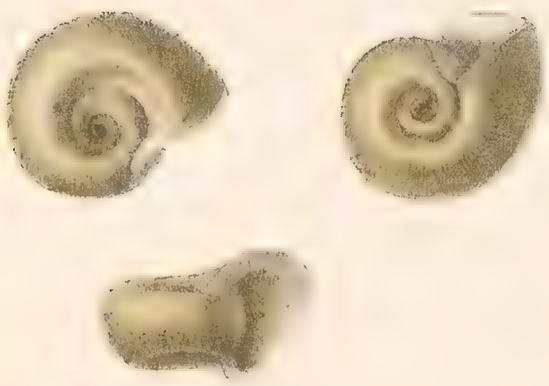

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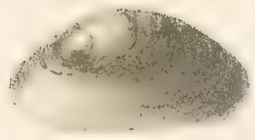

12a

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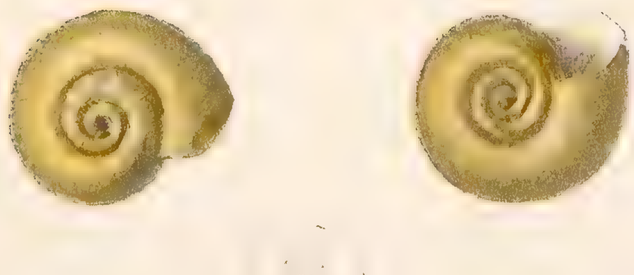

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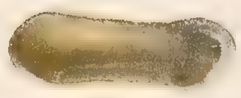

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1	PLANORBIS TENUIS.		6	PLANORBIS FIELDI.		11,11a	ANCYLUS PAPILLARIS.
2	" "	v. UHDEI.	7, 7a	"	TENUIS, *juv.*	12,12a	
3	" "	v. APPLANATUS.	8	"	CARIBAEUS.	13	PLANORBIS MAYA.
4	" "	v. JUVENILIS.	9, 9a	"	" , *juv.*	14	" TEPICENSIS.
5	"	WYLDI, *juv.*	10	"	NICARAGUANUS.	15	" SUBPRONUS.

von Zglinicka ad nat. del. et lith.

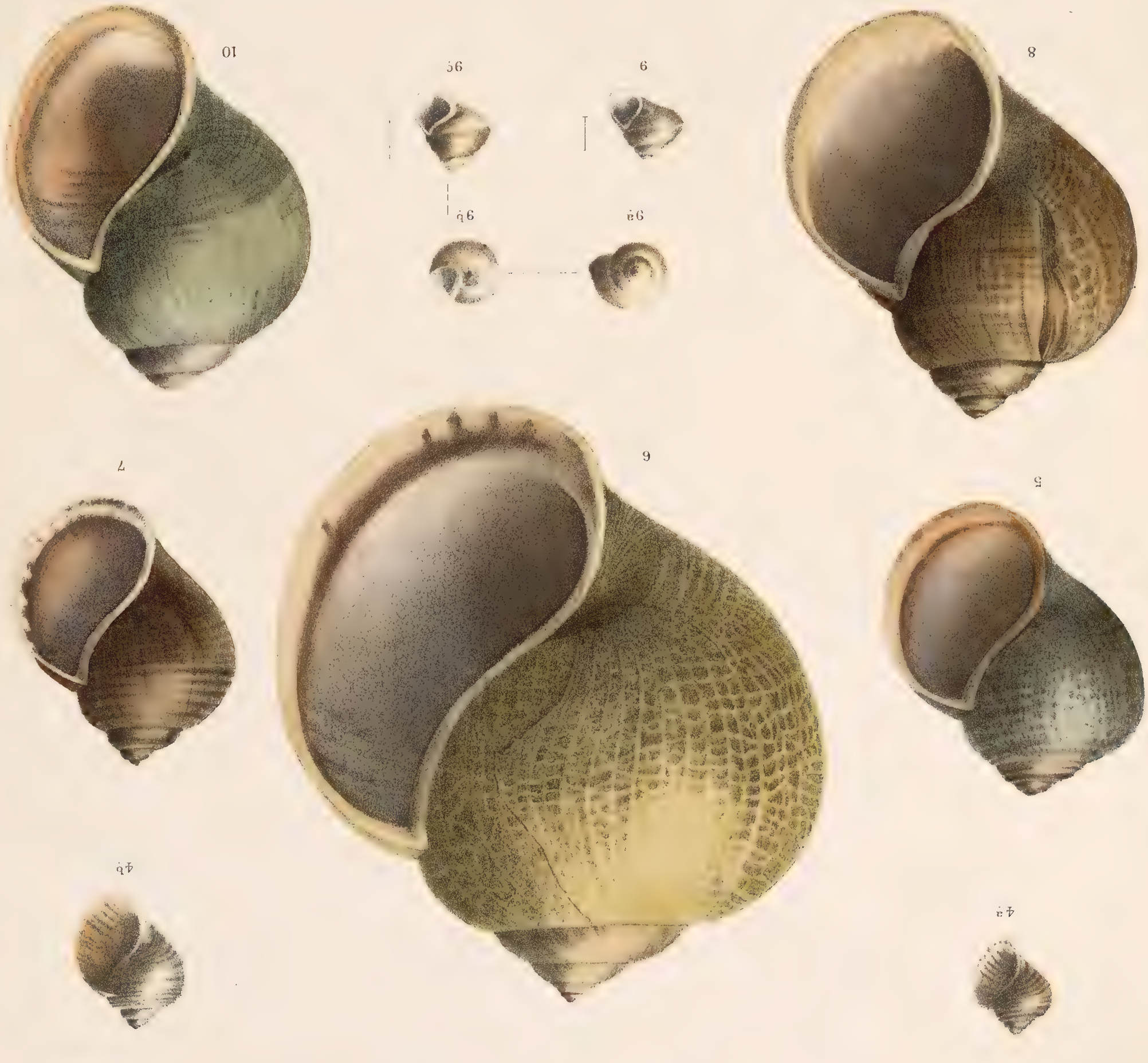
impr. O. Hollmann.

1 AMPULLARIA FLAGELLATA v. TRISTRAMI.
2 " STREBELI.
3 " VIOLACEA.
4 AMNICOLA RHEGOIDES.
5 AMNICOLA SUBANGULATA.
6 " COSTARICENSIS.
7 AMPULLARIA FLAGELLATA v. MELANOSTOMA.
8 AMNICOLA MELANIOIDES.
9 AMNICOLA MELANIOIDES v. TENUIS
10 AMPULLARIA FLAGELLATA v. MALLEATA
11, 11a " " v. GUATEMALENSIS
12 " " v. TRISTRAMI.

von Zglinicka ad nat. del et lith.

Druck von Bogdan Gisevius Berlin

Inches 1 2 3 4 5 6 7 8
Centimetres 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19
KODAK Color Control Patches © The Tiffen Company, 2000
Kodak LICENSED PRODUCT
Blue Cyan Green Yellow Red Magenta White 3/Color Black



1 AMPULLARIA FLAGELLATA. 4 AMPULLARIA FLAGELLATA. 7, 8 AMPULLARIA FLAGELLATA v. ARATA.
2 COCHLIOPA TROCHULUS. 4 a,b " " 9, 9 a,b,c COCHLIOPA IRYONIANA
3 " INFUNDIBULUM. 5 " " v. EXSCULPTA. 10 AMPULLARIA FLAGELLATA v. ARATA
6 " " v. GIGANTEA.

von Zglinicka. ad nat. del. et lith.

Druck von Bogdan Gisevius Berlin

Inches 1 2 3 4 5 6 7 8
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19
Centimetres
KODAK Color Control Patches © The Tiffen Company, 2000
Kodak
LICENSED PRODUCT
Blue Cyan Green Yellow Red Magenta White 3/Color Black

1-6 AMPULLARIA GERASUM.
7 " HONDURASENSIS.
8 AMPULLARIA DELATTREI.
9 " YUCATANENSIS v. YZABALENSIS.
10, 11 " CONOIDEA.
12, 13 AMPULLARIA PEALFANA.
14-17 " COSTARICANA.

von Zglinicka. ad nat. del. et lith.

Druck von Bogdan Gisevius Berlin

Inches 1 2 3 4 5 6 7 8
Centimetres 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19
KODAK Color Control Patches © The Tiffen Company, 2000
Kodak LICENSED PRODUCT
Blue Cyan Green Yellow Red Magenta White 3/Color Black

1, 1a, 1b AMPULLARIA ROTULA.
2, 3 PACHYCHILUS GLAPHYRUS, v. PYRAMIDALIS.
4 " " LARGILLIERTI, v. NODULOSUS.
5 PACHYCHILUS PANUCULA, v. TUMIDUS.
6 " OBELISCUS, v. PYRGISCUS.
7 " LACUSTRIS, v. AMPHIBOLUS.
8 " " v. MAJOR.
9, 10 PACHYCHILUS LACUSTRIS, v. CONRADTI.
11, 13 " SUBNODOSUS.
12 " LARGILLIERTI.

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Druck von Bogdan Gisevius, Berlin.

Inches 1 2 3 4 5 6 7 8
Centimetres 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19
KODAK Color Control Patches © The Tiffen Company, 2000
Kodak LICENSED PRODUCT
Blue Cyan Green Yellow Red Magenta White 3/Color Black

1 PACHYCHILUS PLURISTRIATUS. 3 PACHYCHILUS LARGILLIERTI, v. SALVINI. 5 – 9 PACHYCHILUS LARGILLIERTI, v. STOLLI.
2 " LARGILLIERTI. 4 " DALLI. 10–20 " TURATII.

von Zglinicka. ad nat. del. et lith.

Druck von Bogdan Gisevius, Berlin.

Land Gastropoda.

Mollusca. Tafe. 26.

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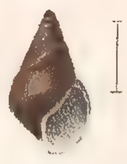

11a

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1, 2 PACHYCHILUS LIEBMANNI.
3-5 „ ÖRSTEDI.
6-9 PACHYCHILUS CHRYSALIS *juv.*
10 „ CORVINUS, v. INDIFFERENS.
11, 11a „ „ „ *juv.*
12-14 PACHYCHILUS CHRYSALIS, v. NYMPHA.
15-18 „ CHRYSALIS.

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KODAK Color Control Patches © The Tiffen Company, 2000
Kodak LICENSED PRODUCT
Blue Cyan Green Yellow Red Magenta White 3/Color Black
Centimeters 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19
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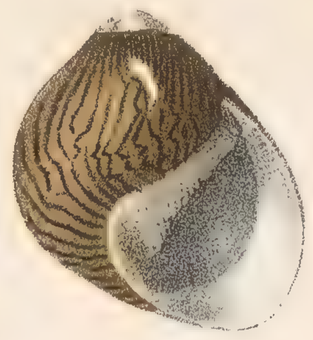

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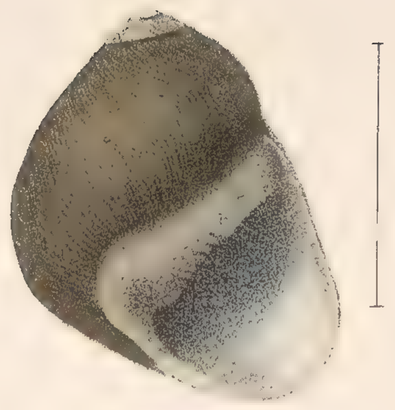

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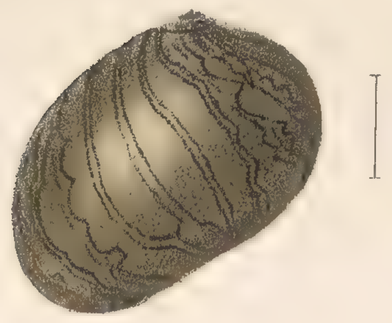

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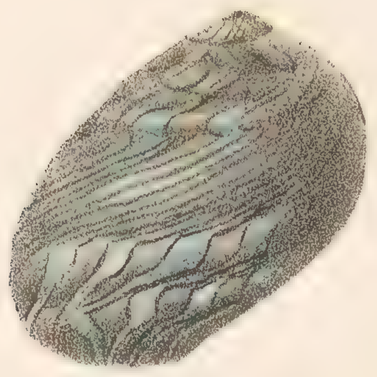

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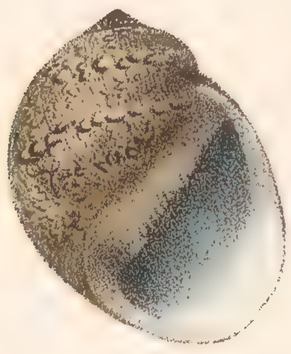

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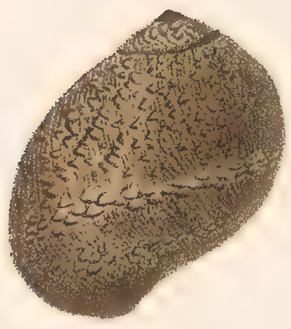

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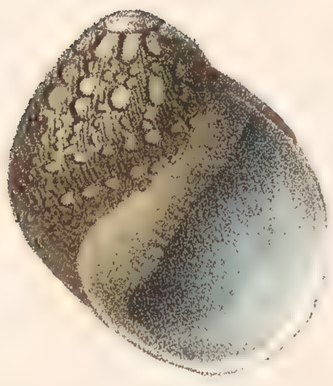

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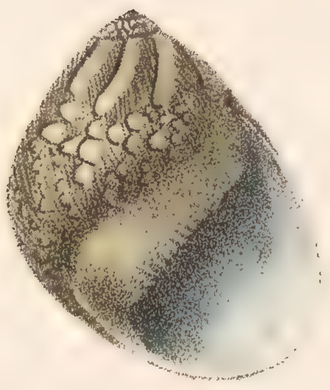

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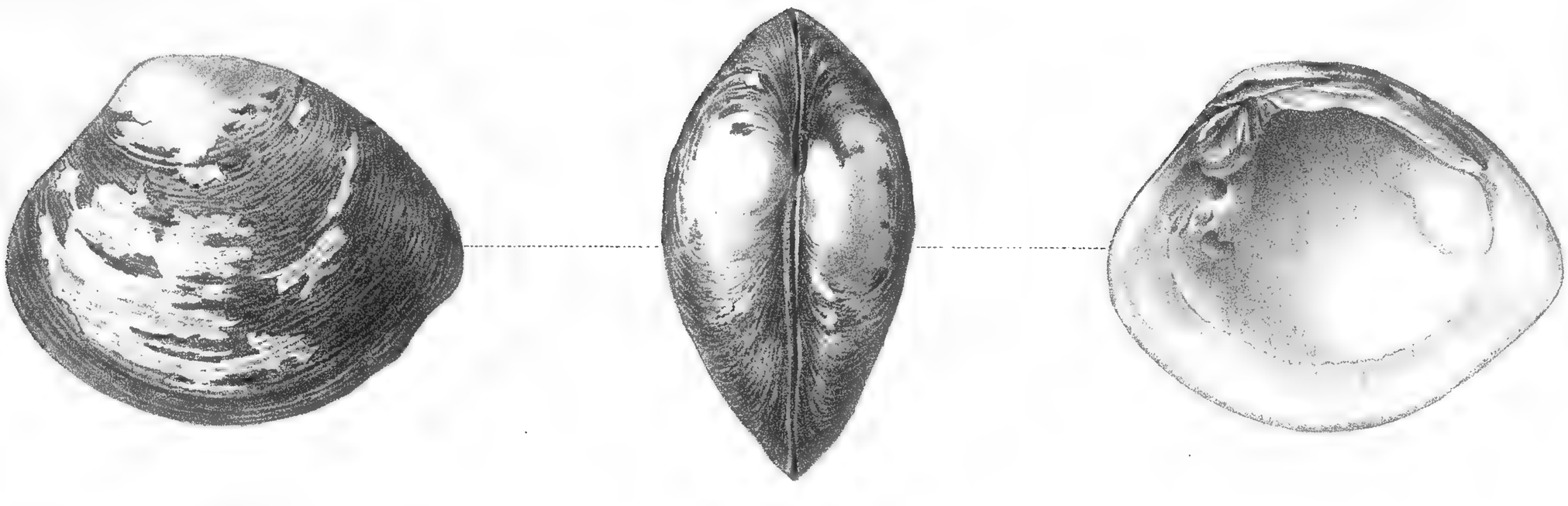
13

1;3,4,5 NERITINA LINEOLATA, v. PARCEPICTA.
2,6 „ LINEOLATA.
7 NERITINA LINEOLATA, v. RETICULATA.
8,10 „ PICTA.
9, 9a „ CASSICULUM.
11,12 NERITINA VIRGINEA.
13 „ PICTA, v. SERTA.

von Zglinicka ad nat. del. et lith.

Druck von Bogdan Gisevius, Berlin.

KODAK Color Control Patches © The Tiffen Company, 2000
Kodak LICENSED PRODUCT
Blue Cyan Green Yellow Red Magenta White 3/Color Black
Centimeters
Inches



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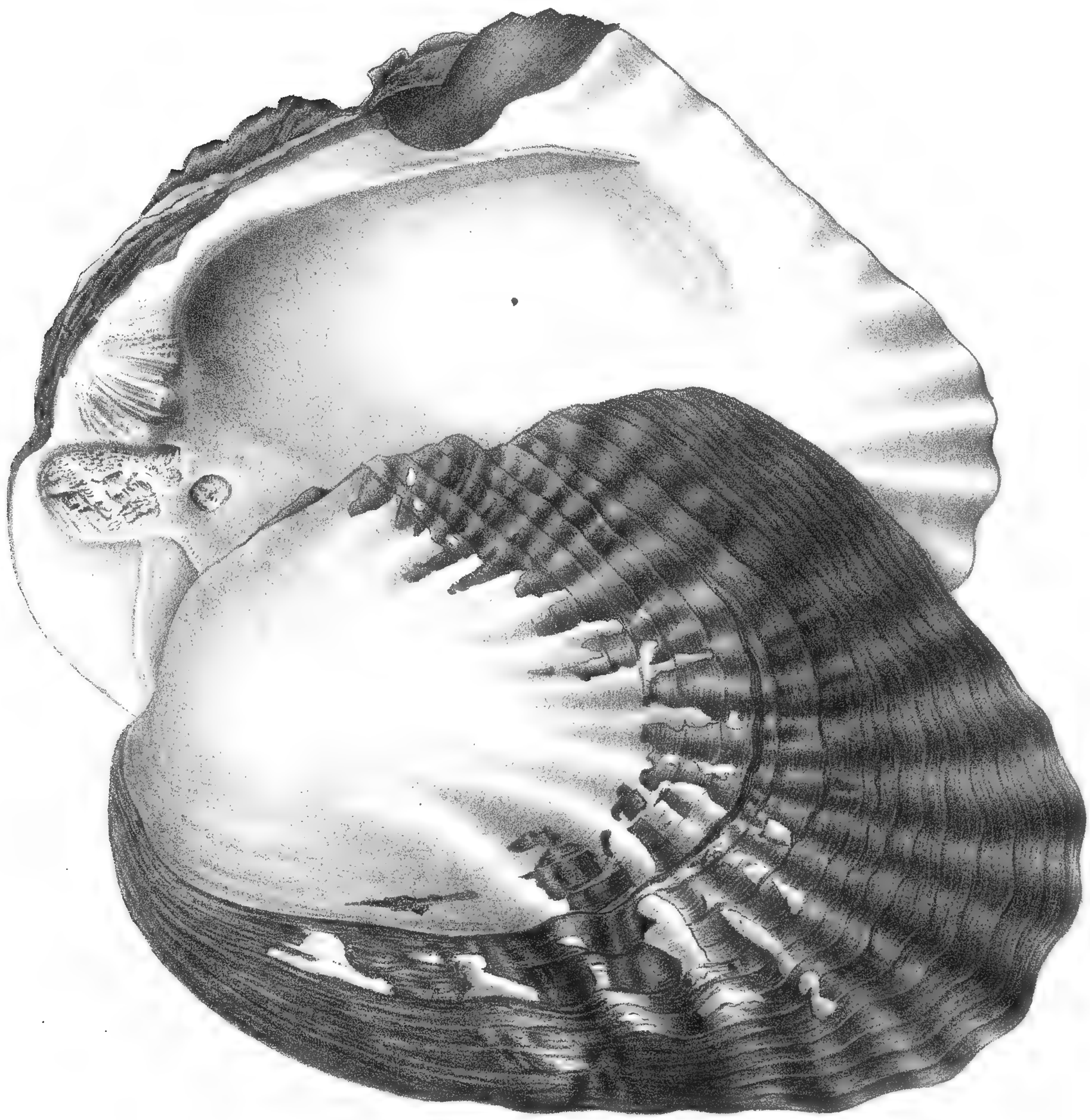

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1, 1a, b UNIO NEWCOMBIANUS.
2 " STOLLI.

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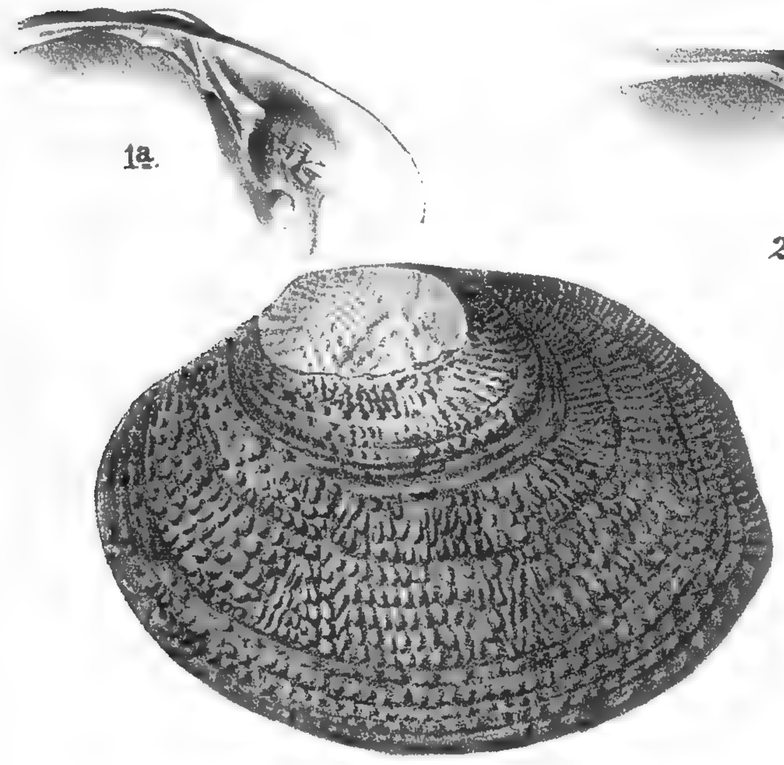
impr. O. Hollmann.



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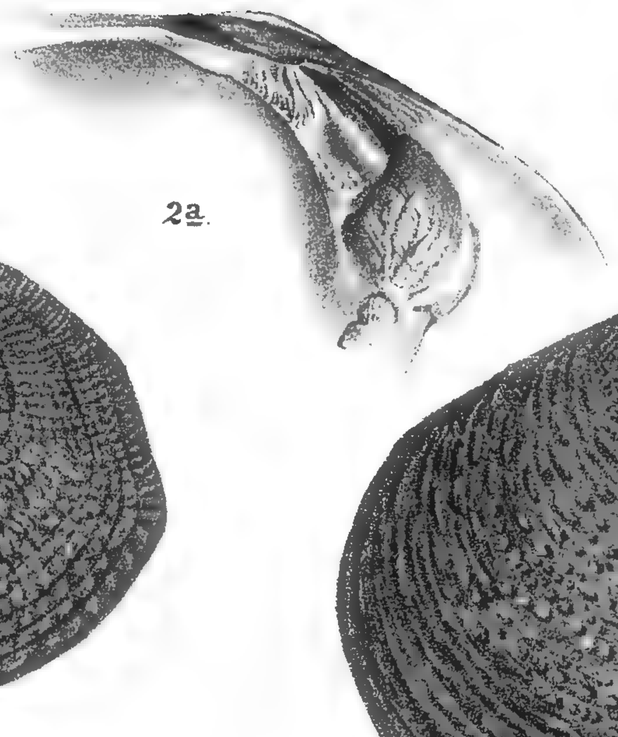

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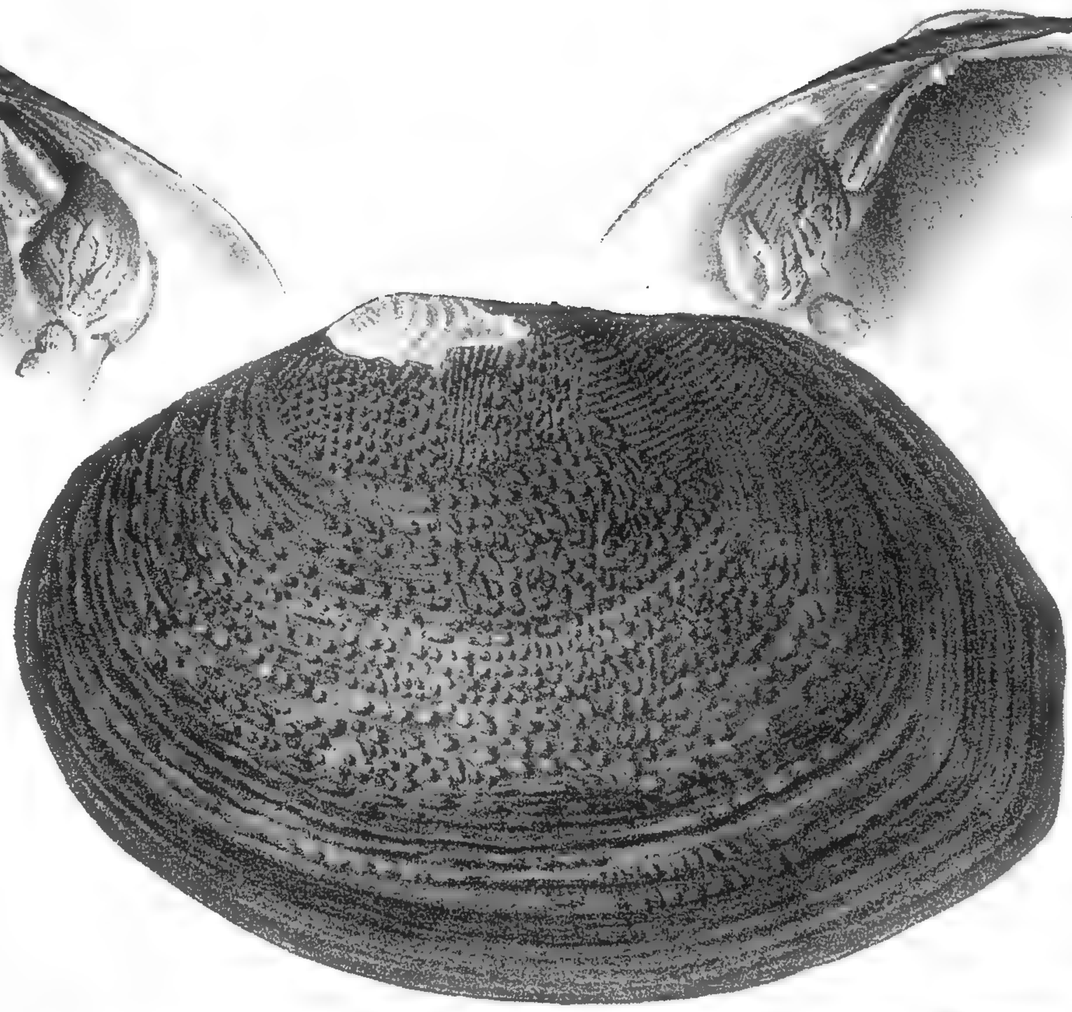

2b.

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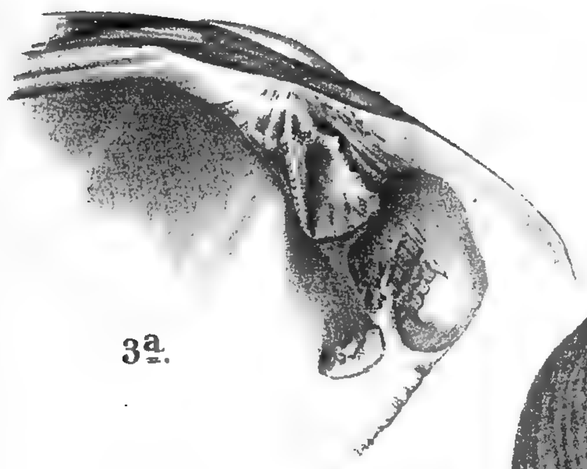

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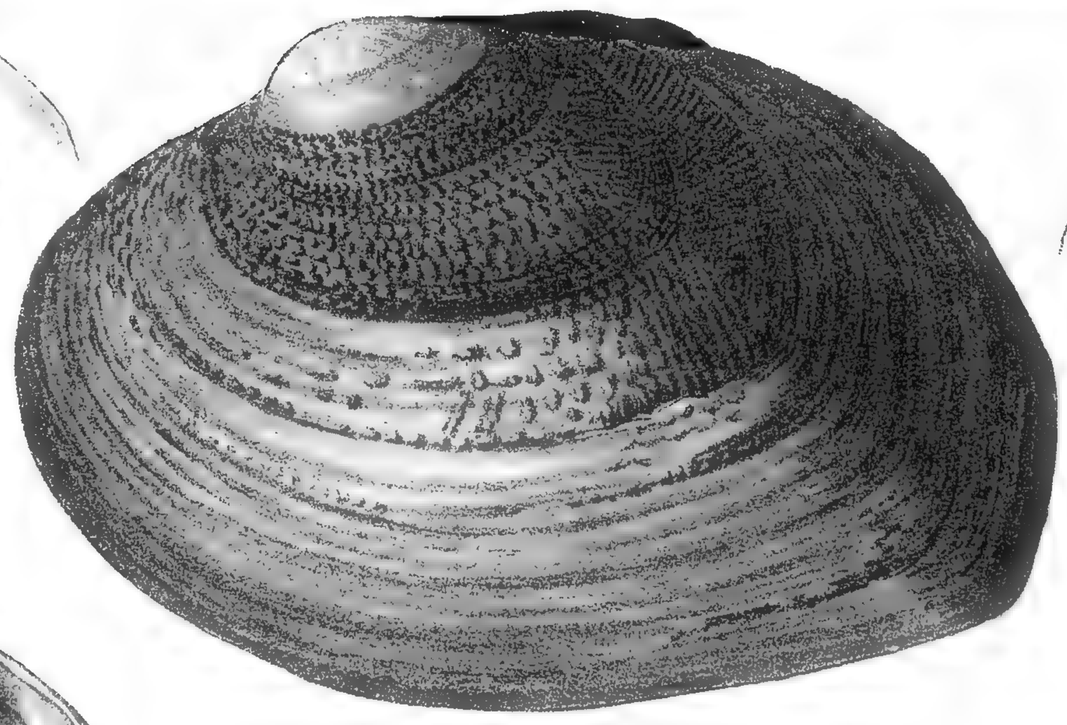
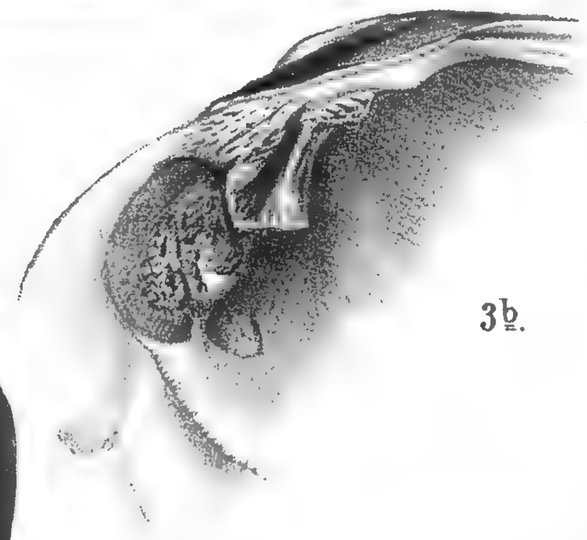
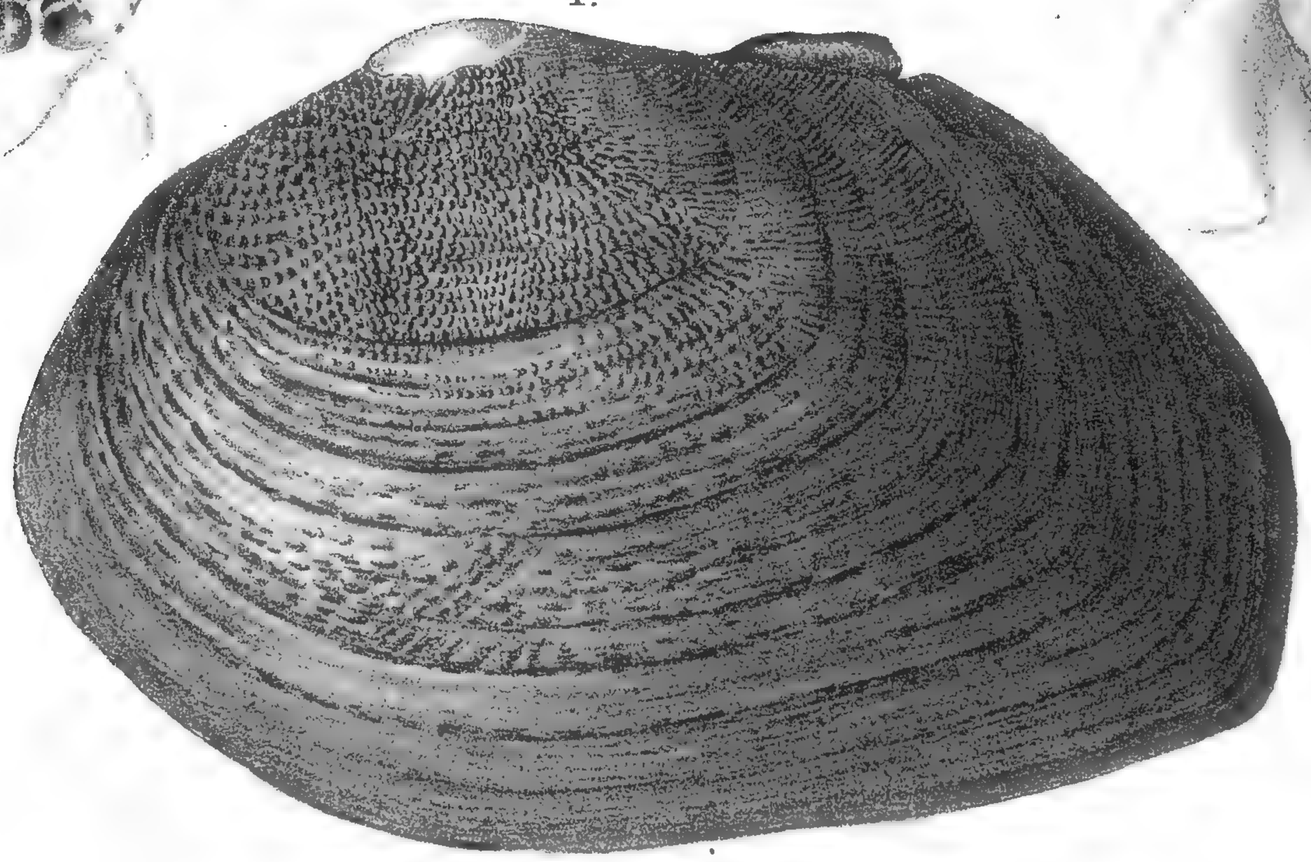


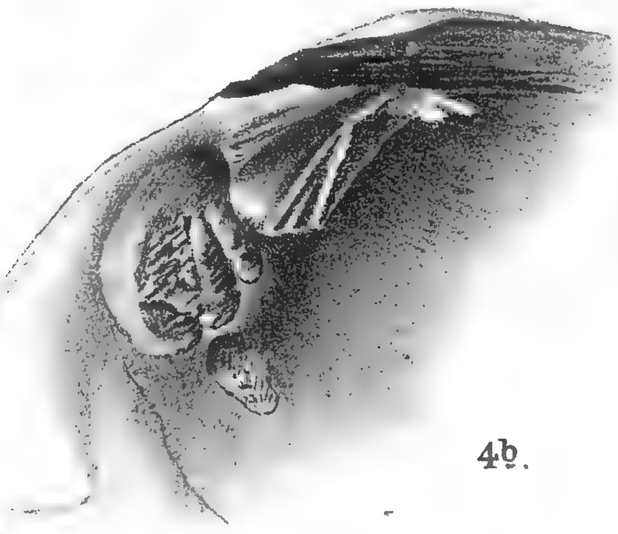


3b.

4a.

4.





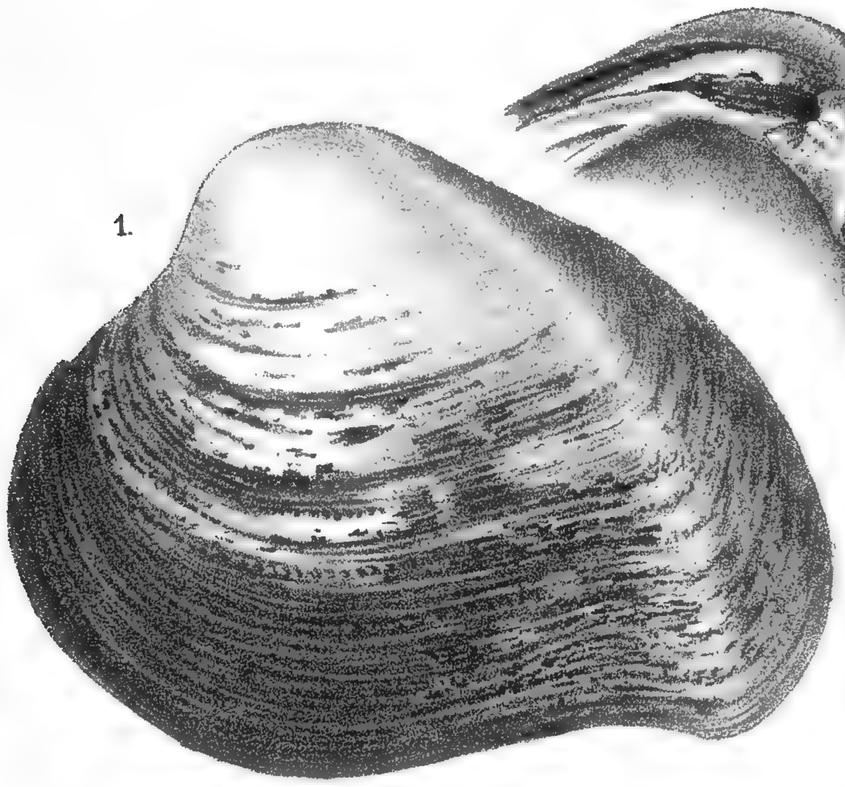
4b.

1–4 UNIO SEMIGRANOSUS.

von Zglinicka ad nat. del. et lith.

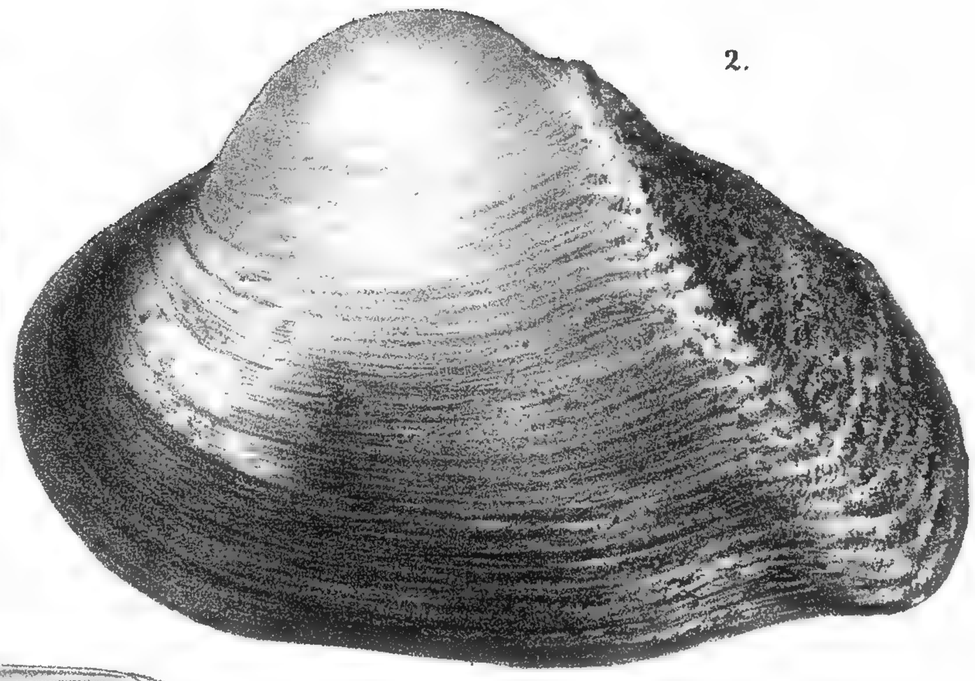
impr. O. Hollmann.

1.

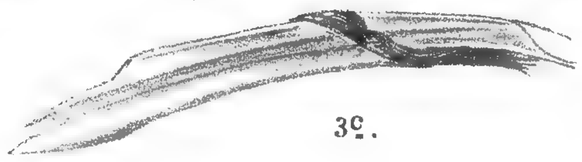


1a.

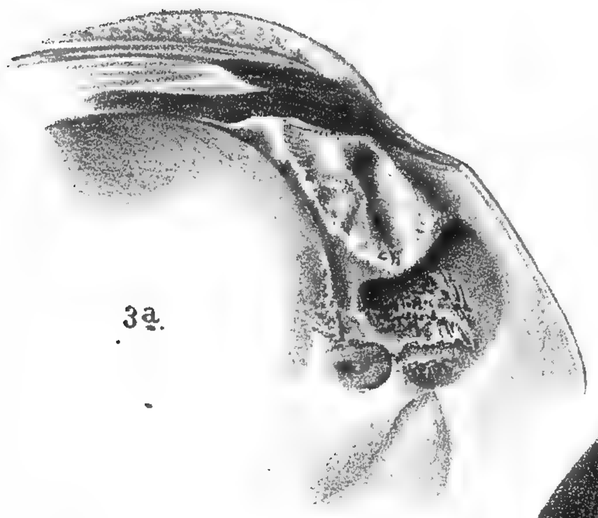
2.



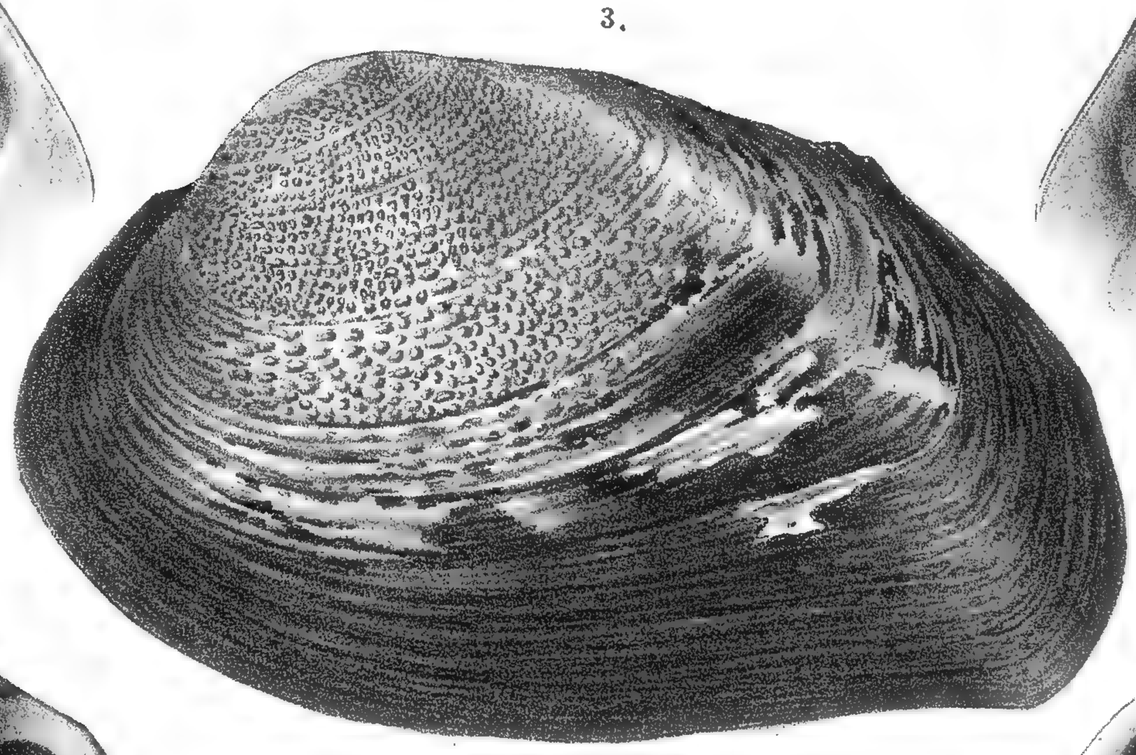
3c.



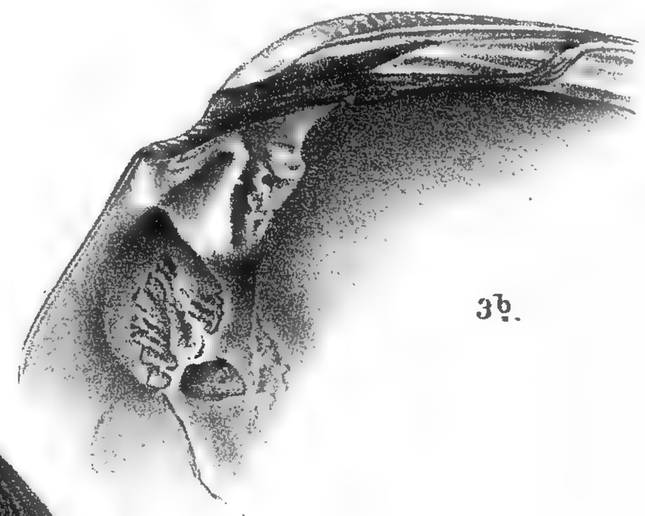
3a.



3.



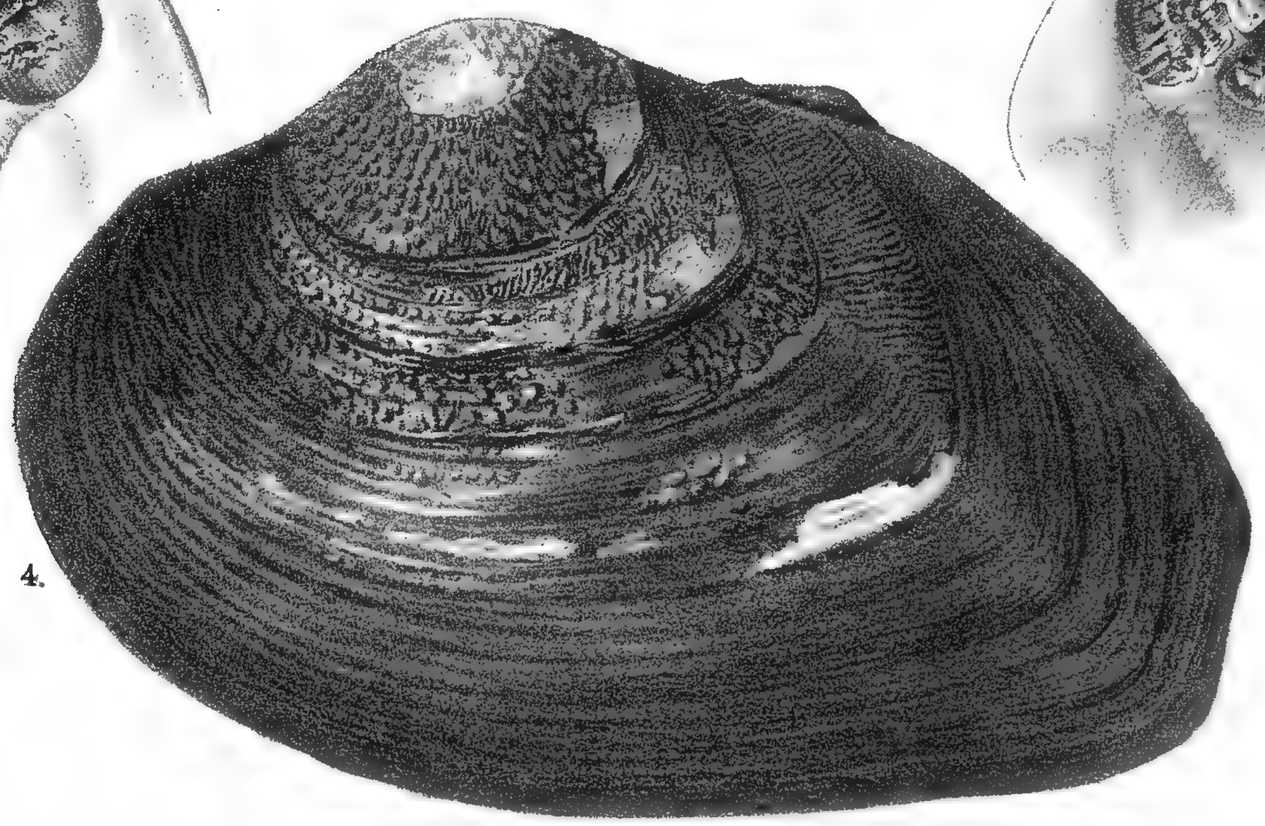
3b.



4a.

4b.

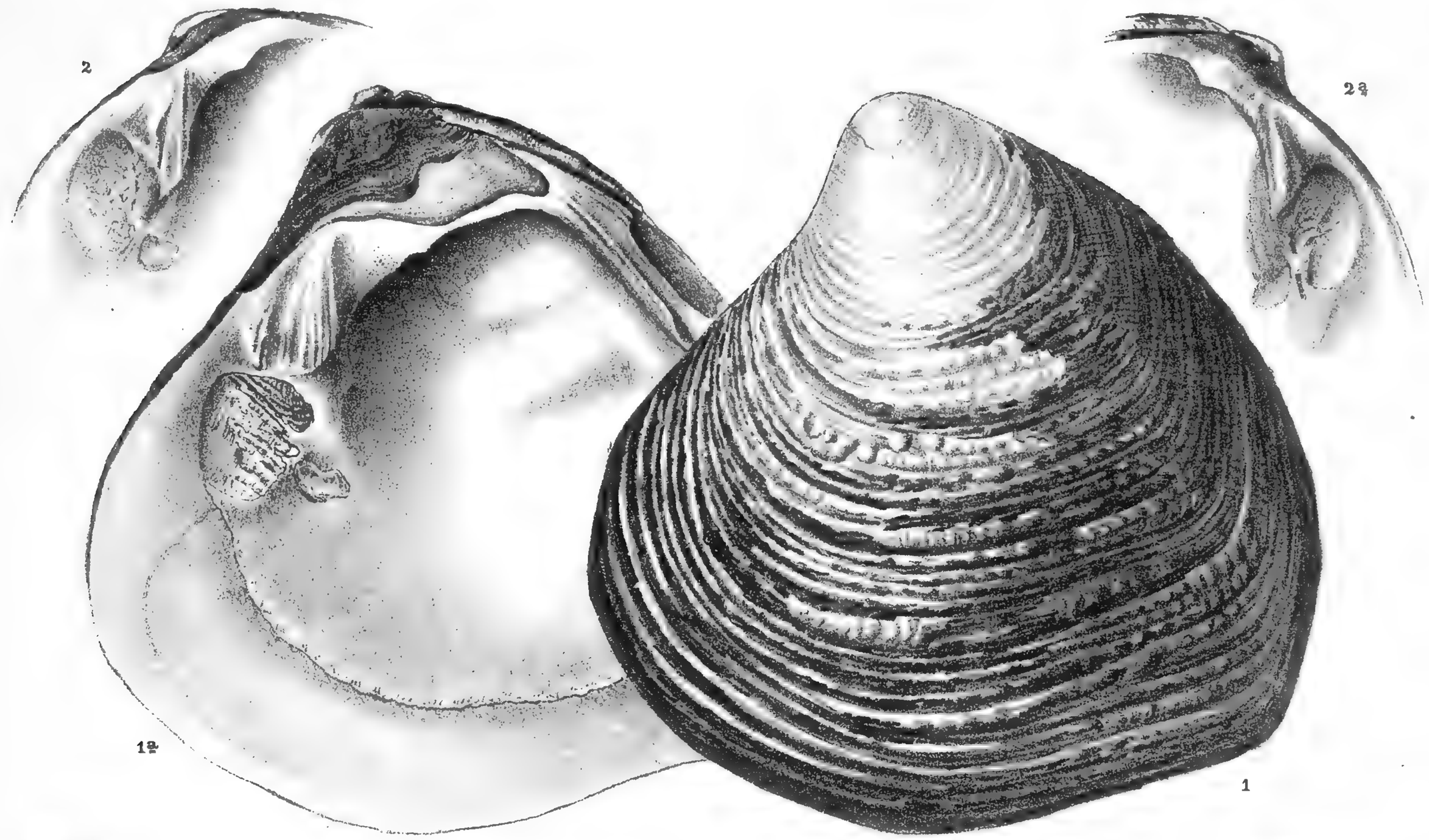
4.

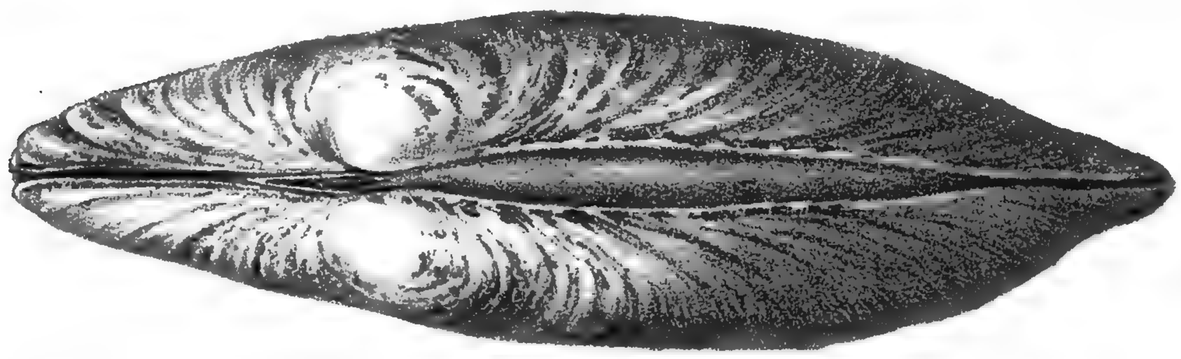


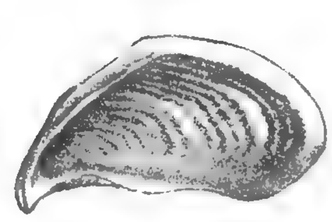
1, 1a, 2 UNIO PSORICUS.
3, 3a, b, c „ CROCODILORUM.
4, 4a, b „ CORIUM.

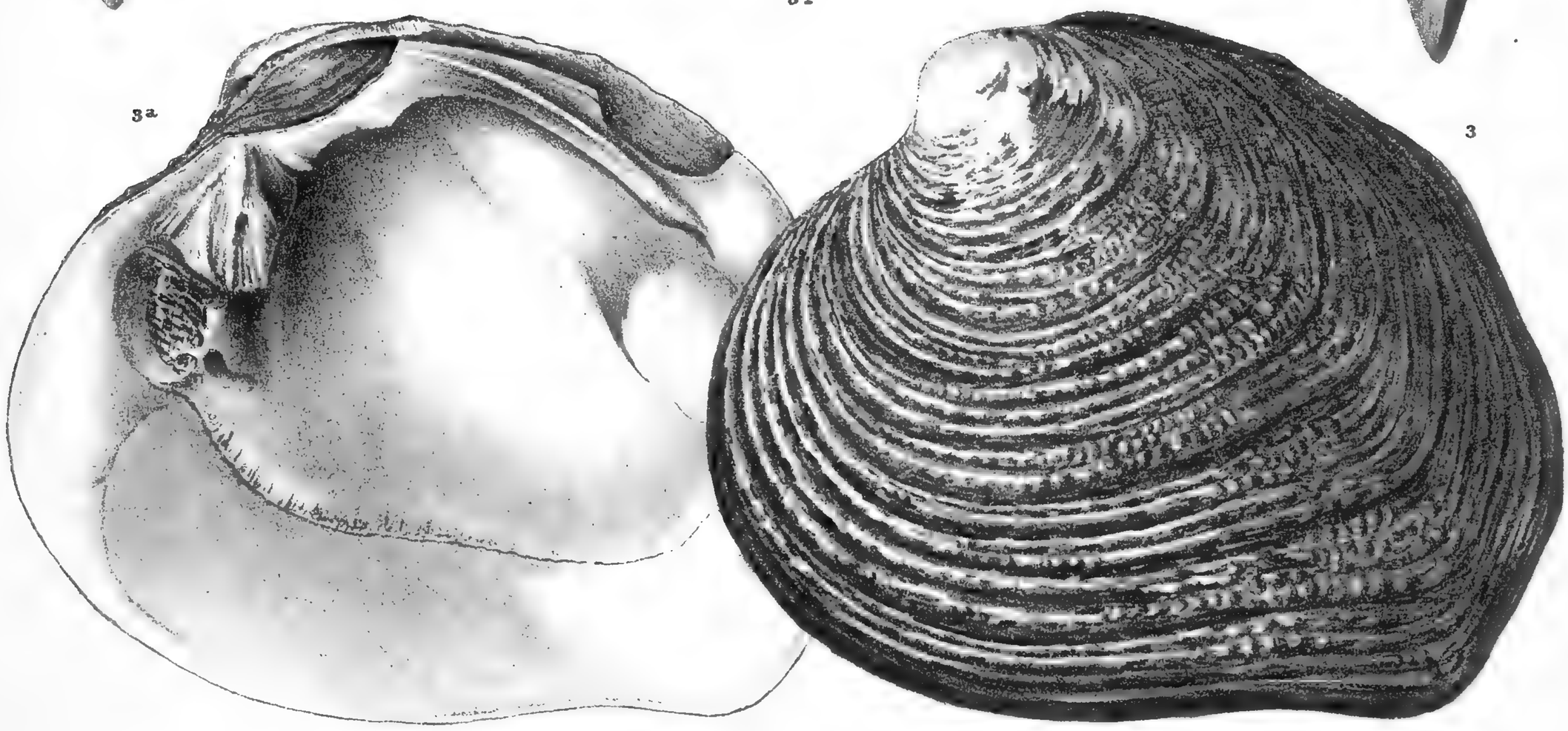
von Zglinicka ad nat. del. et lith.

impr: O. Hollmann.





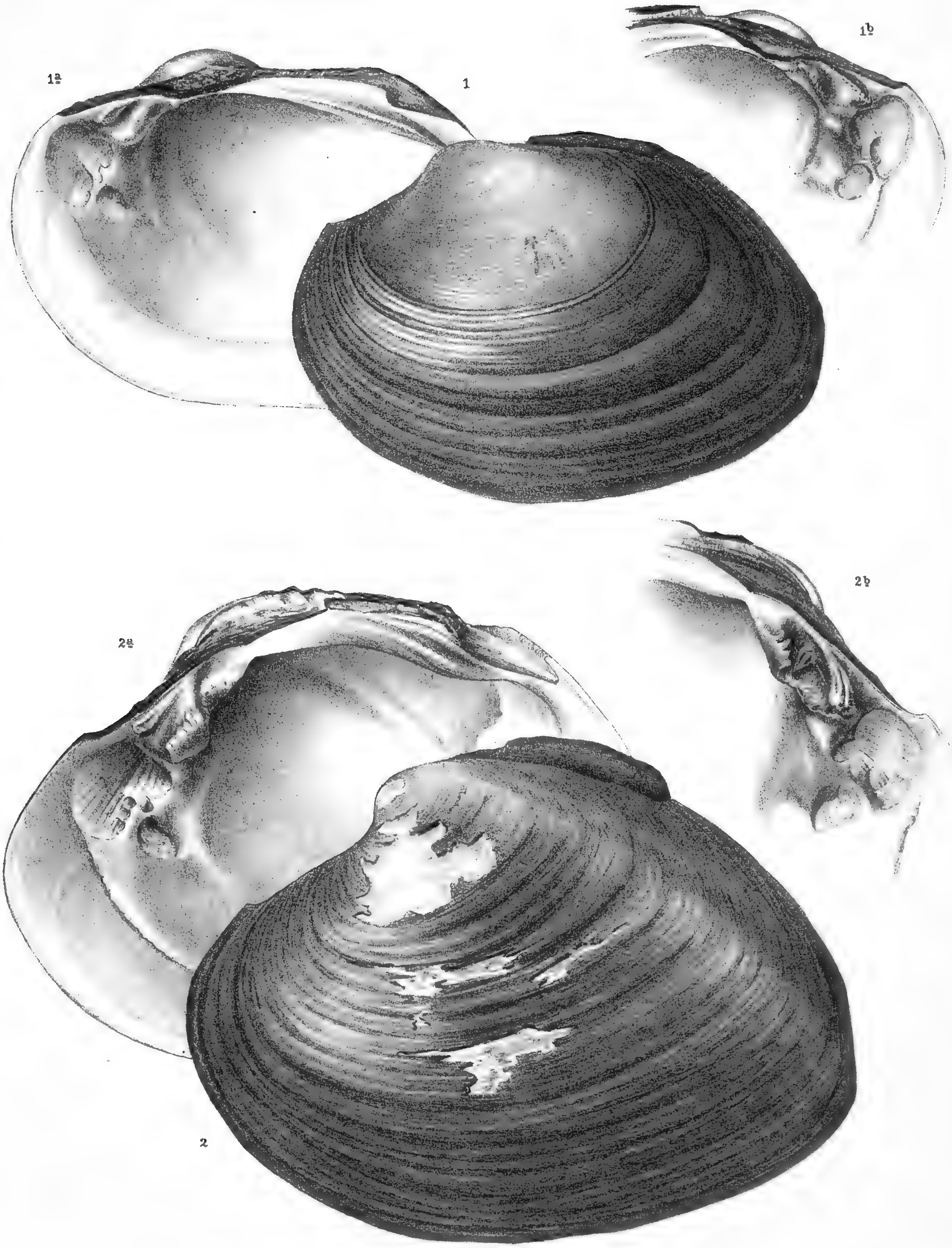




1 – 3 UNIO PERCOMPRESSUS.
4 – 5 DREISSENA SALLEI.

von Zglinicka ad nat. del. et lith.

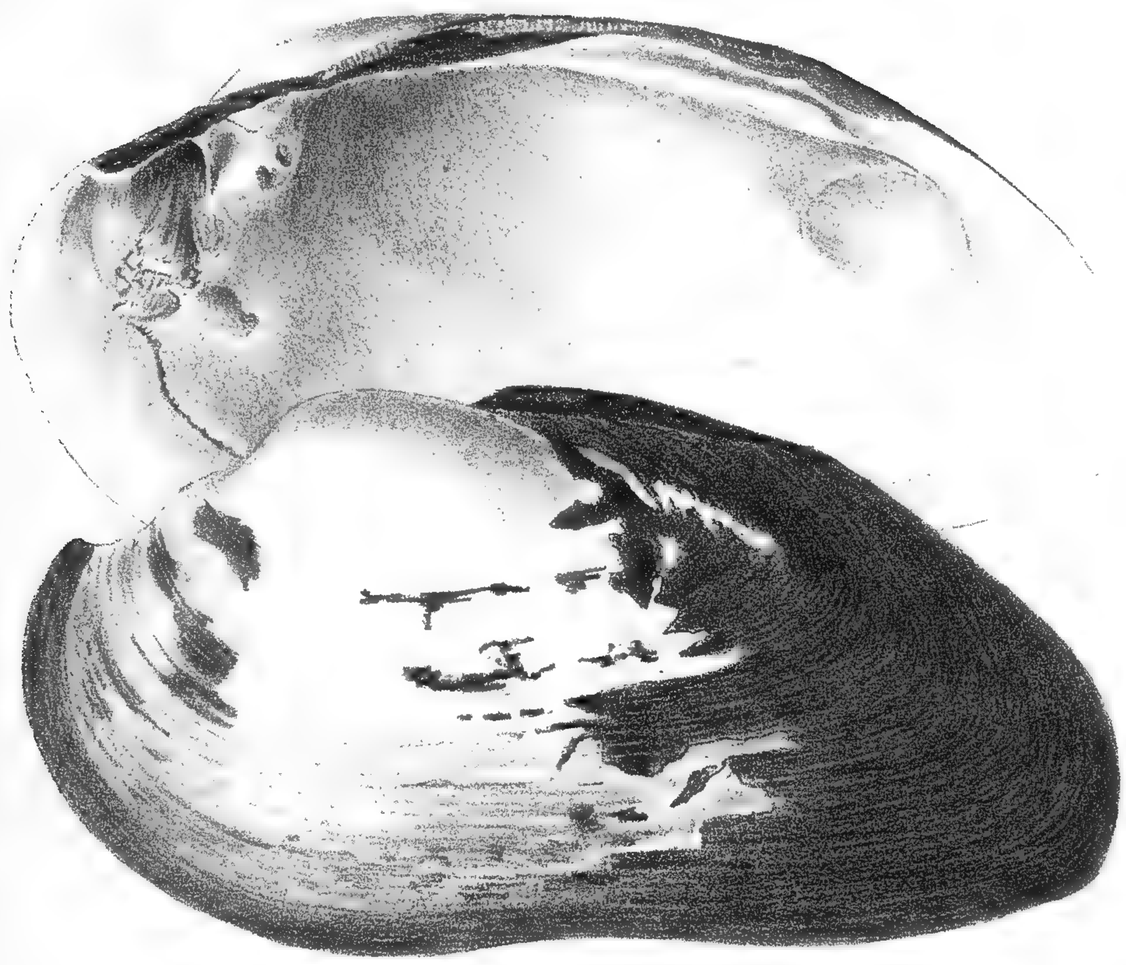
impr. O. Hollmann.



1, 1a, b UNIO TAMPICOENSIS.
2, 2a, b » PANUCOENSIS.

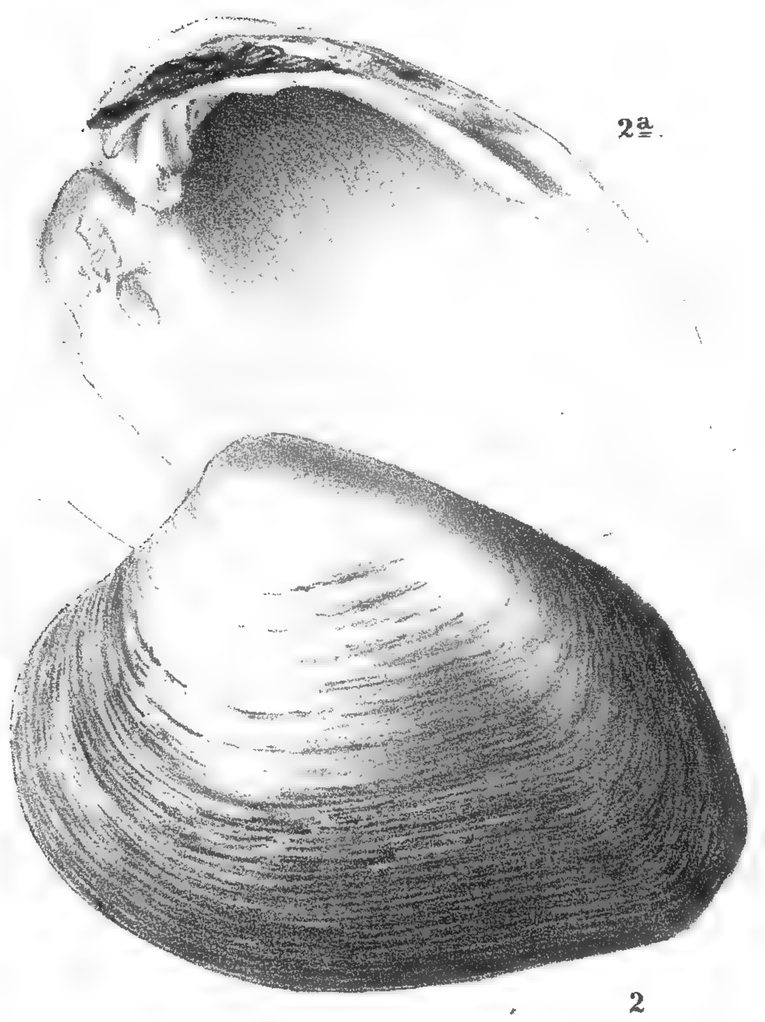
von Zglinicka ad nat. del. et lith.

impr. O. Hollmann.



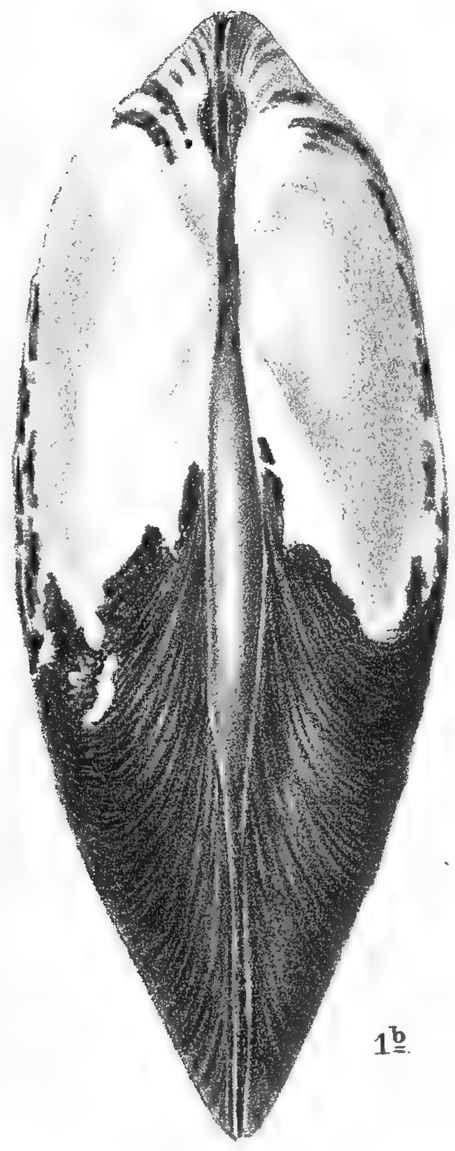
1a

1



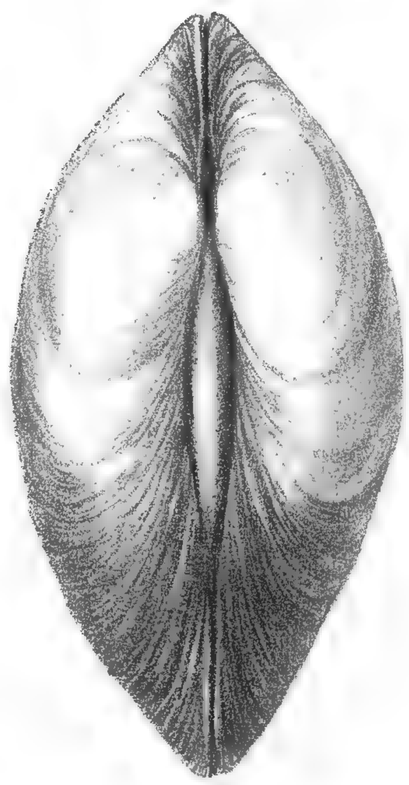
2a

2

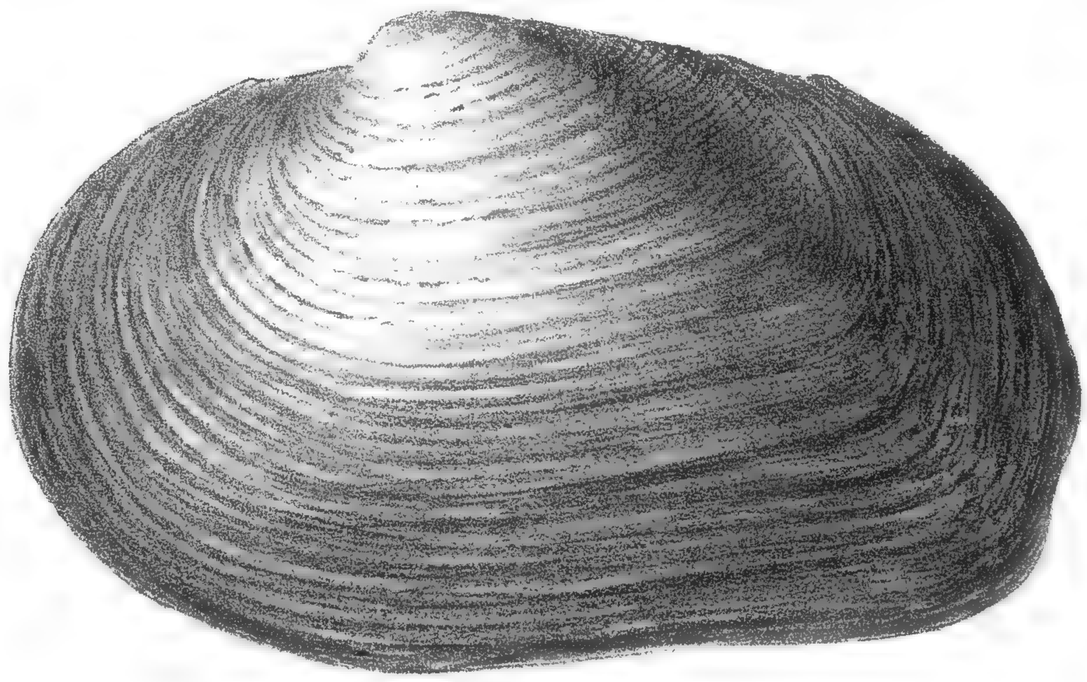


1b

3a



2b

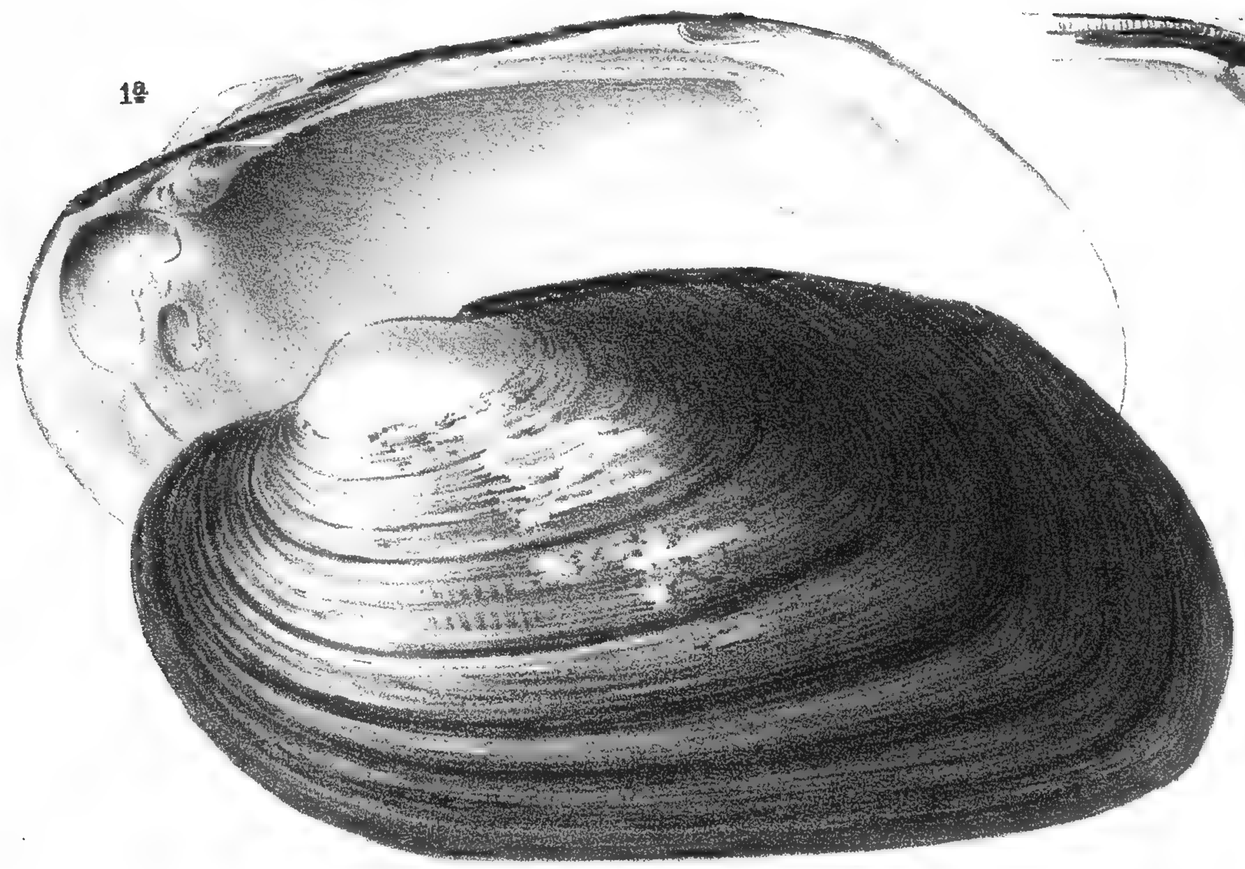


3

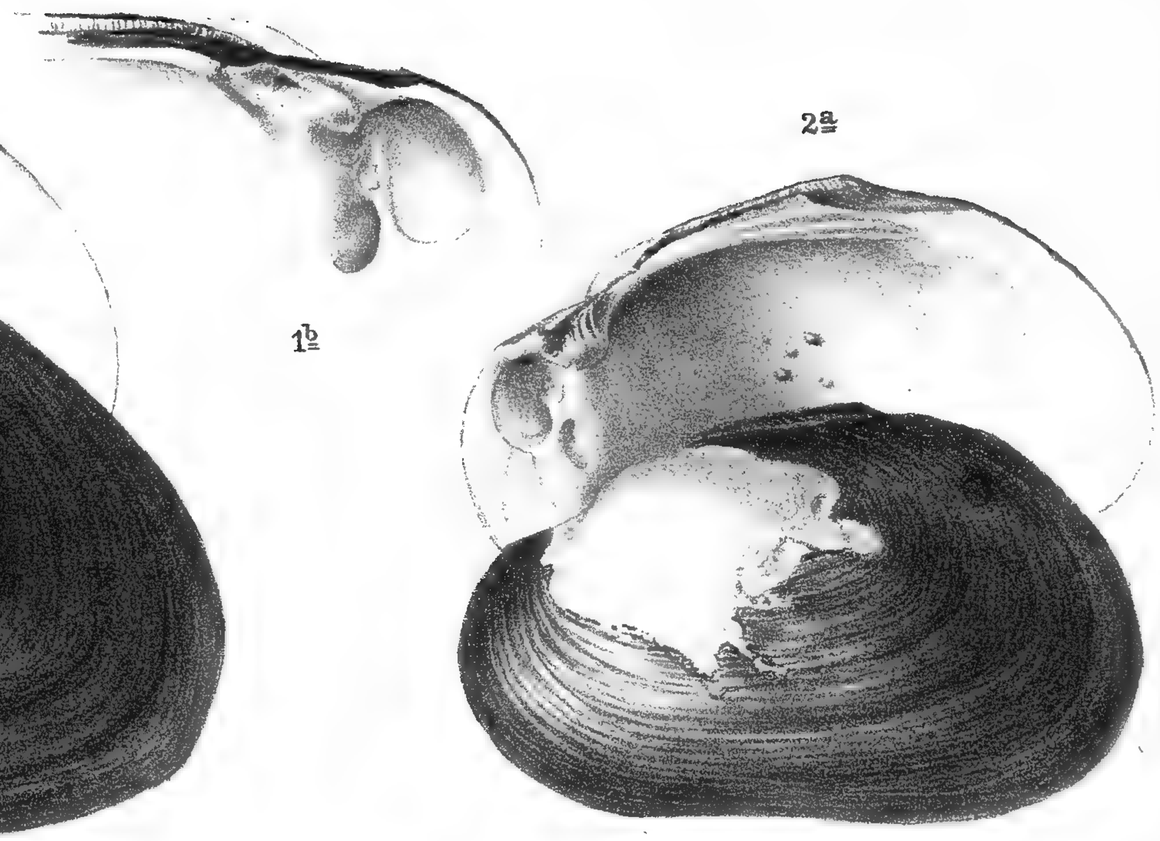
1, 1a, b UNIO LIEBMANNI.
2, 2a, b " SALLEI, var. GROSSUS.
3, 3a " RUBICUNDUS.

Fr. Zollinska ad nat. del. et lith.

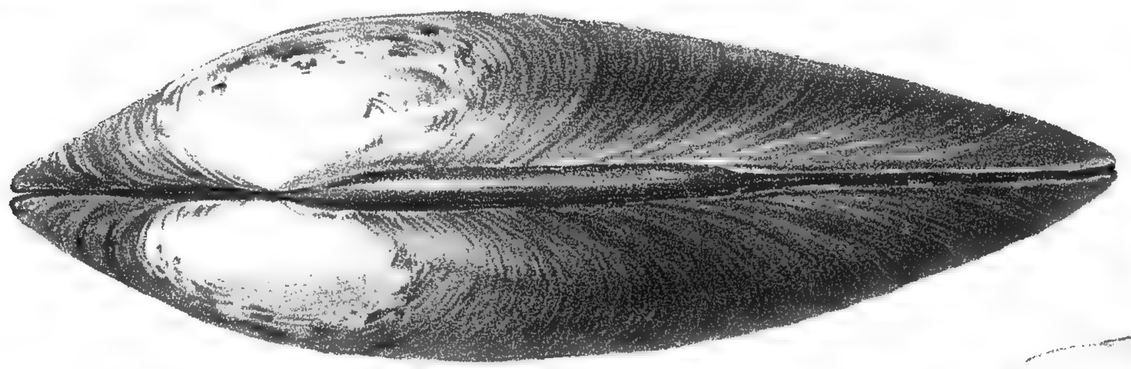
Impr. C. Hollmann.

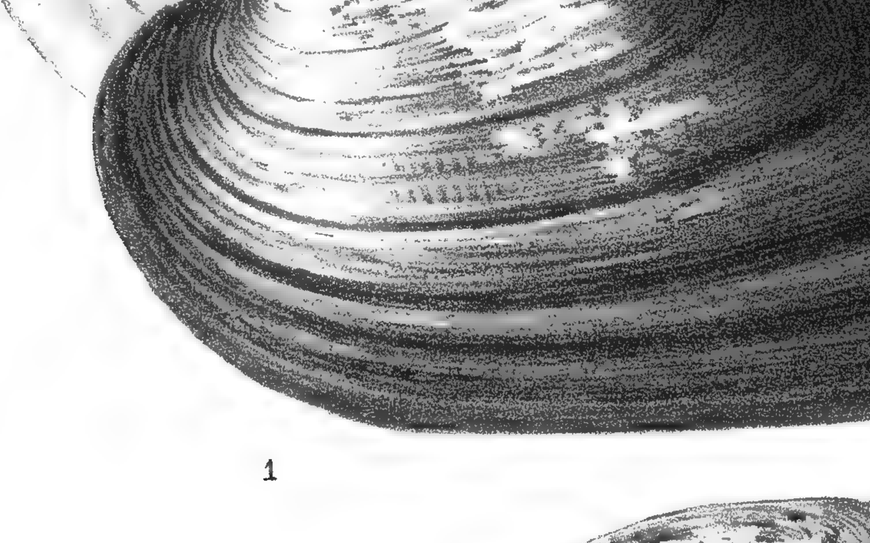


1

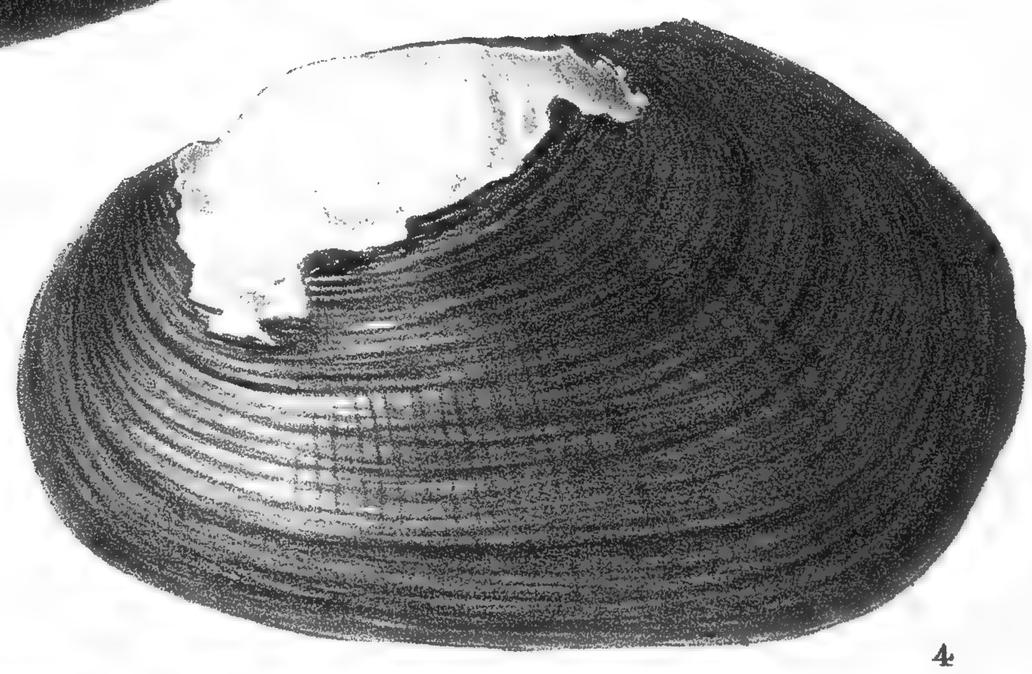


2

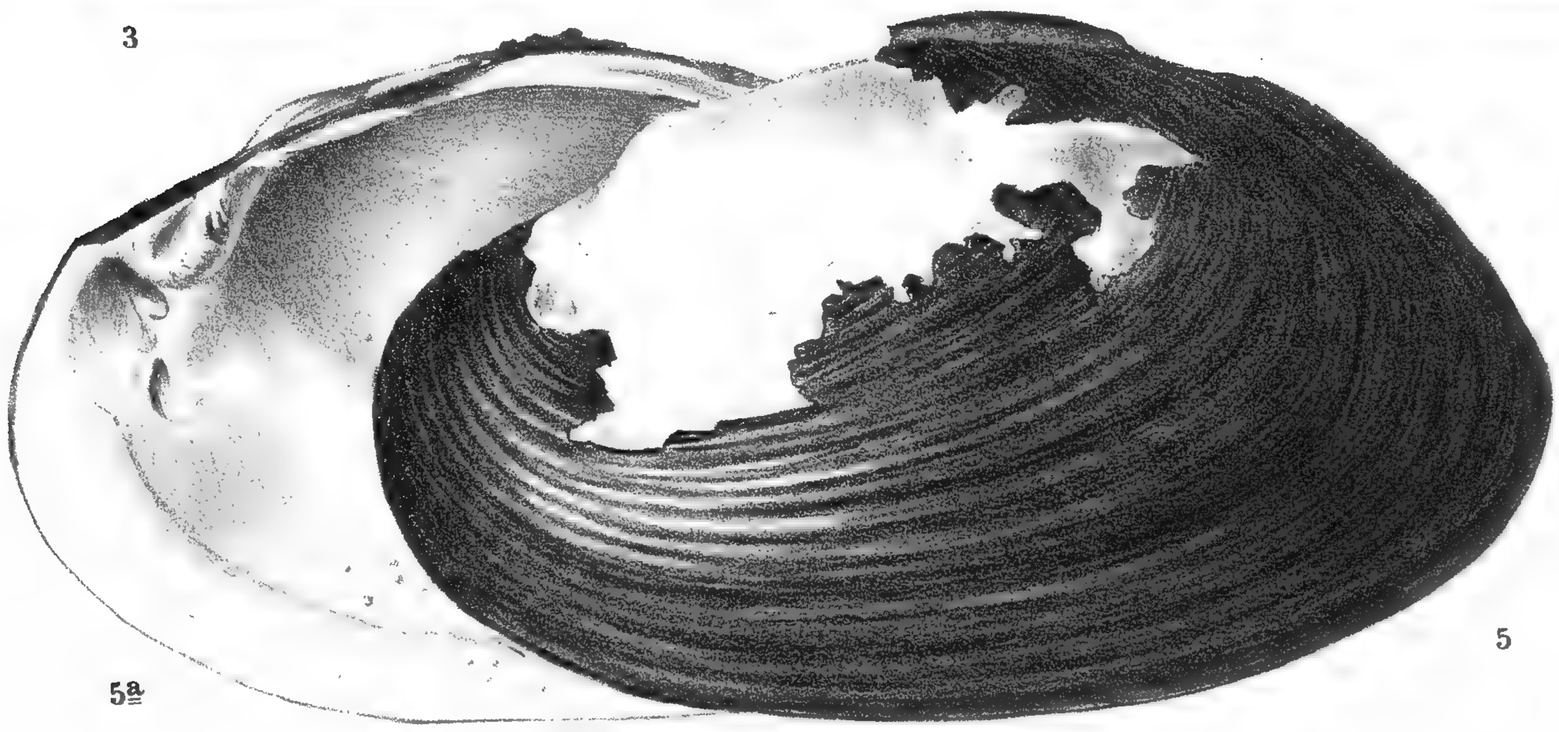




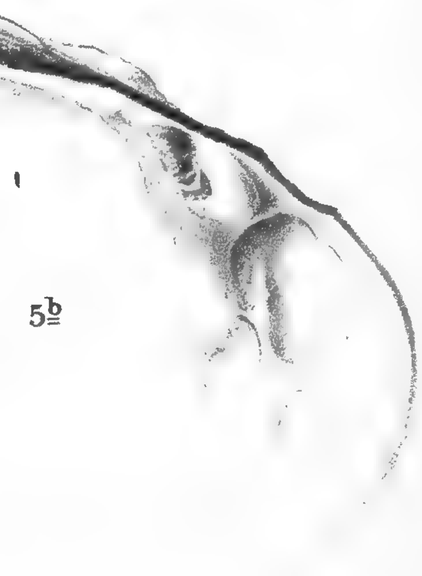
3



4



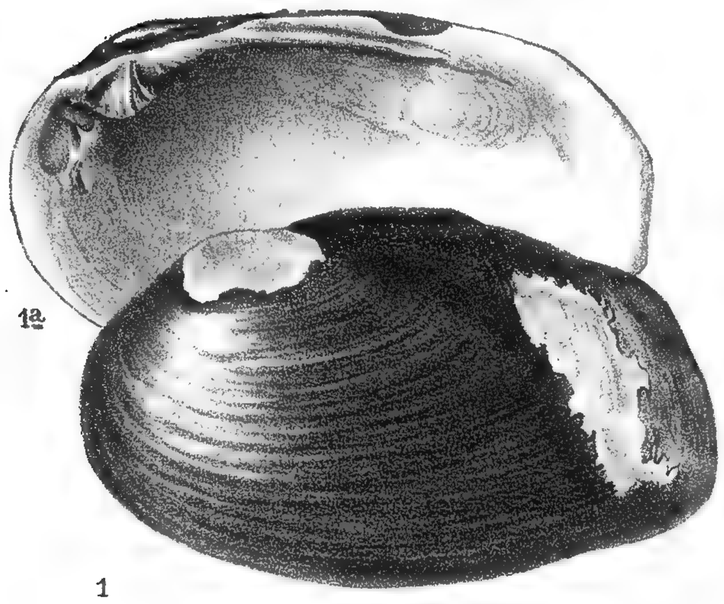
5



1, 1a, b, c. UNIO MICRODON.
2, 2a , ALIENIGENUS.
3-5, 5a, b , UMBROSUS.

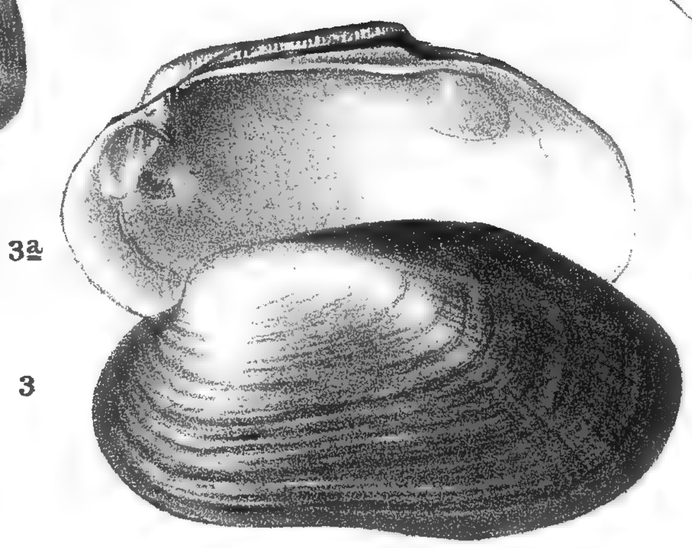
von Zglinicka ad nat. del. et lith.

impr. O. Hollmann.



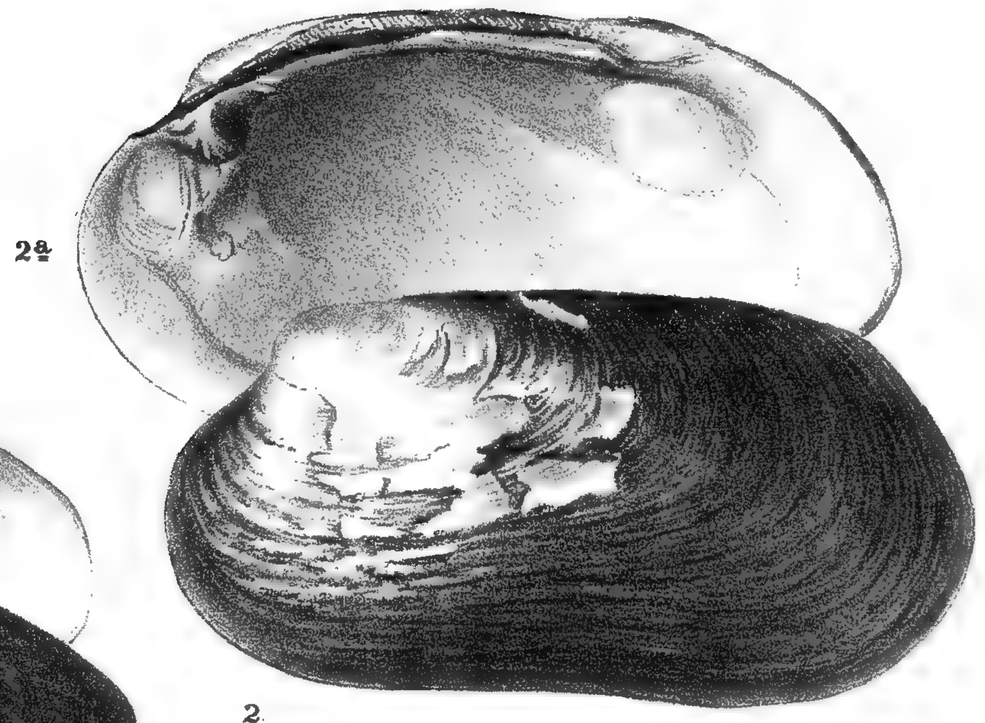
1a

1



3a

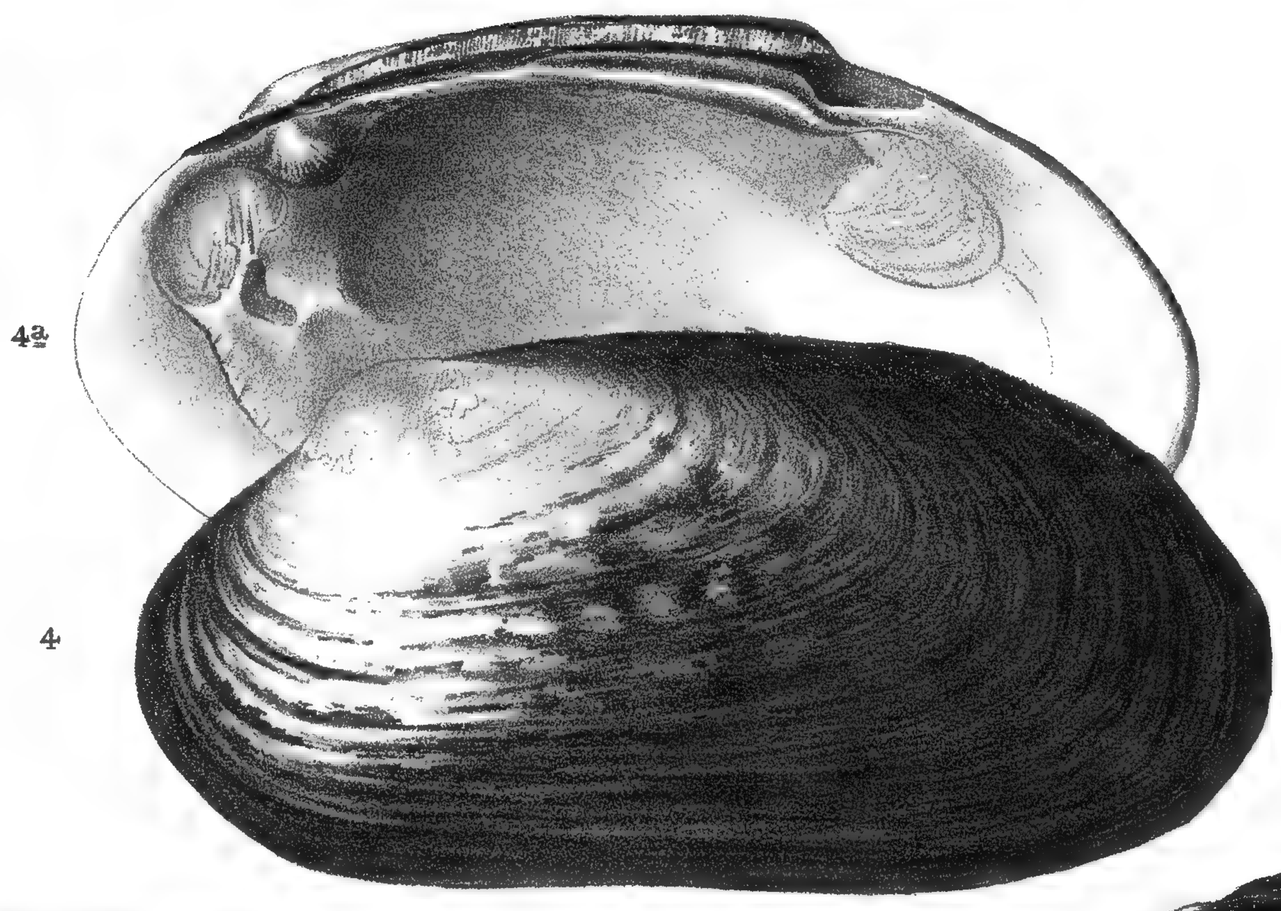
3



2a

2

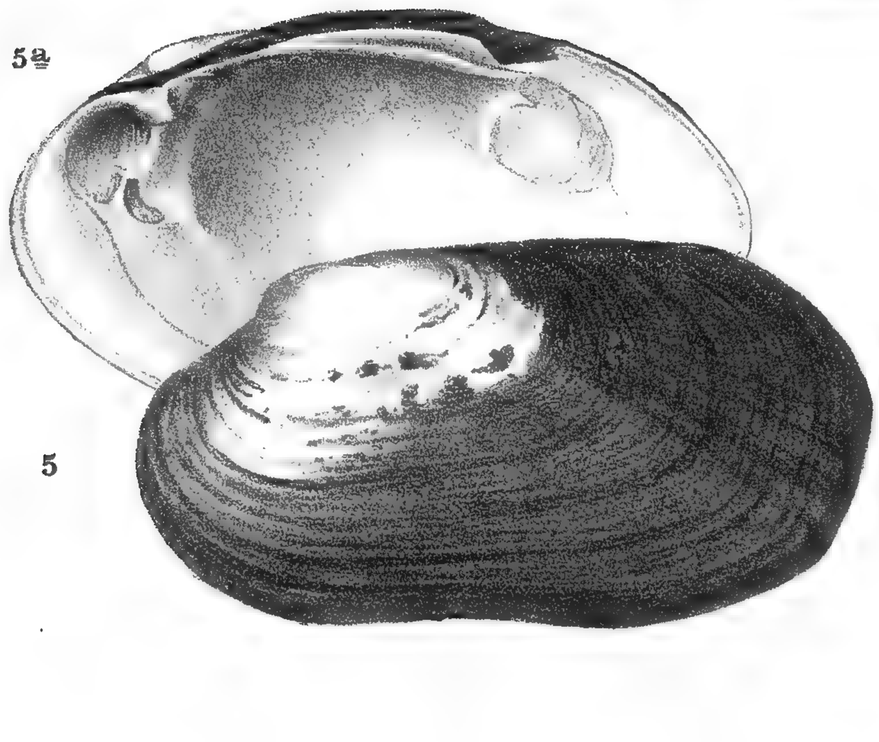
1b



4a

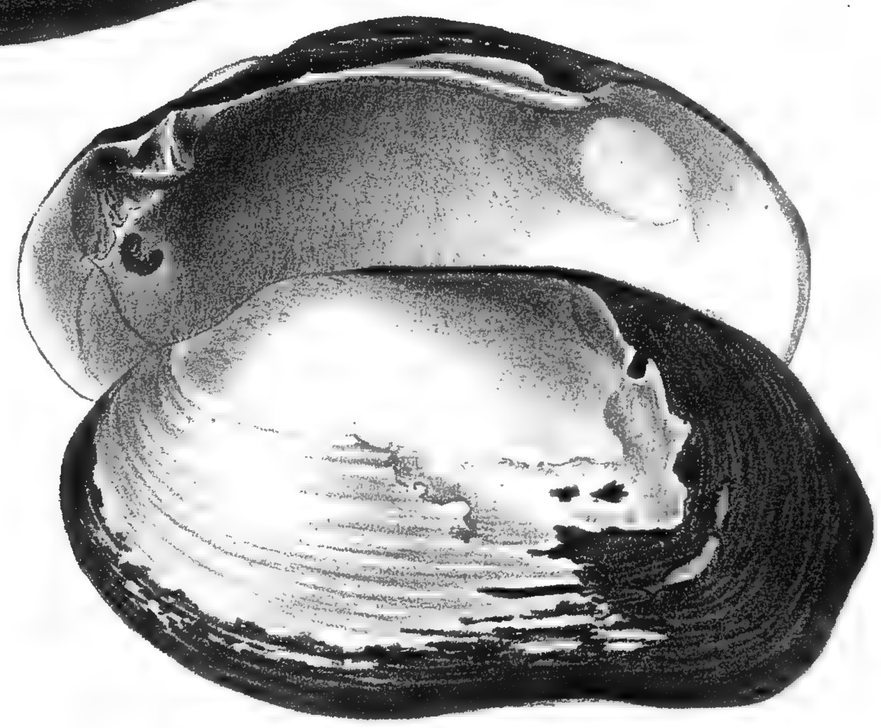
4

2b



5a

5



6a

6

1, 1a,b UNIO CUPRINUS var. SUBVENTRALIS.

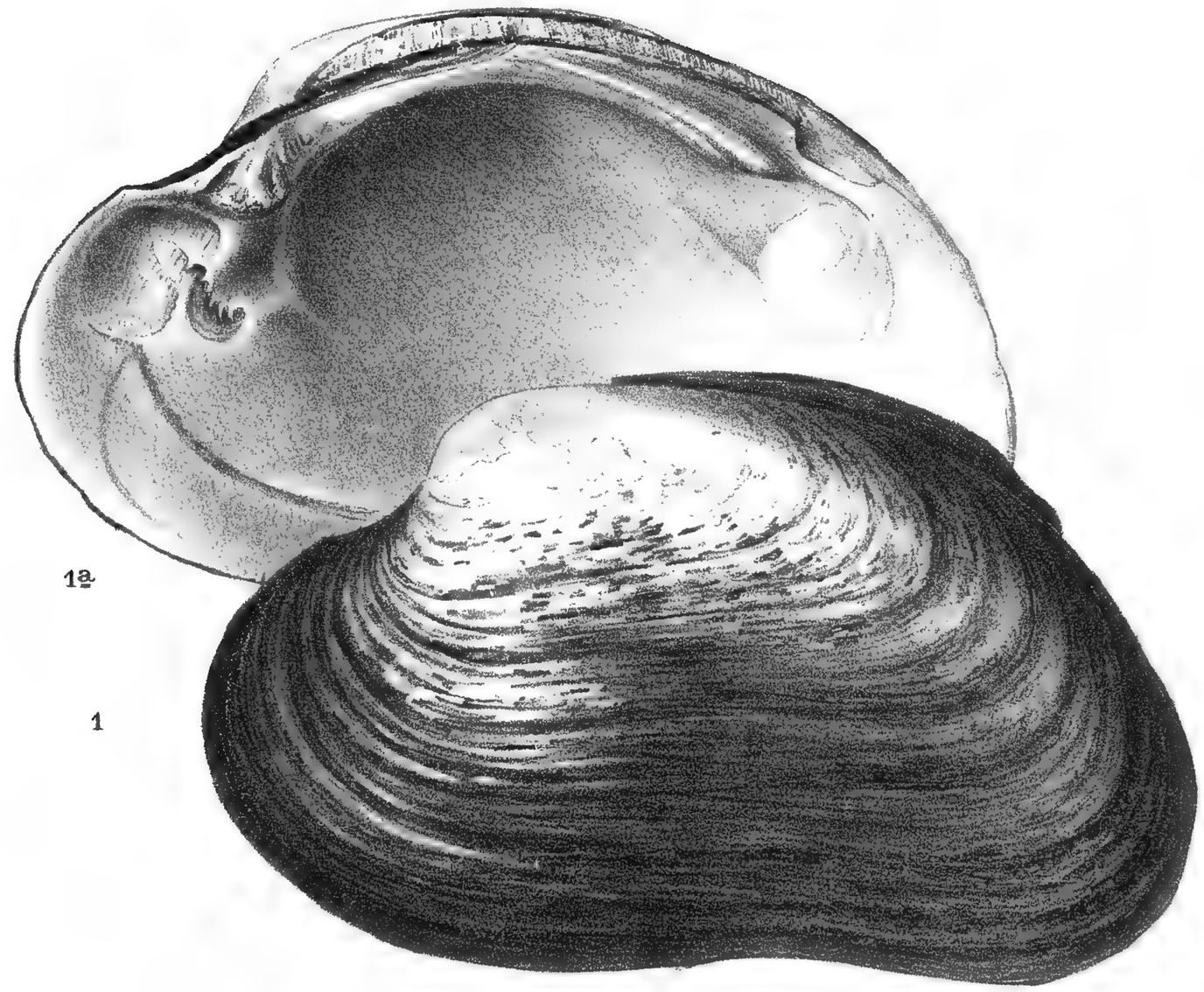
2,2a,b, 3,3a, 4,4a „ AZTECORUM.

5, 5a „ „ var. CHAPALENSIS.

6, 6a „ TEHUANTEPECENSIS var. COPANENSIS.

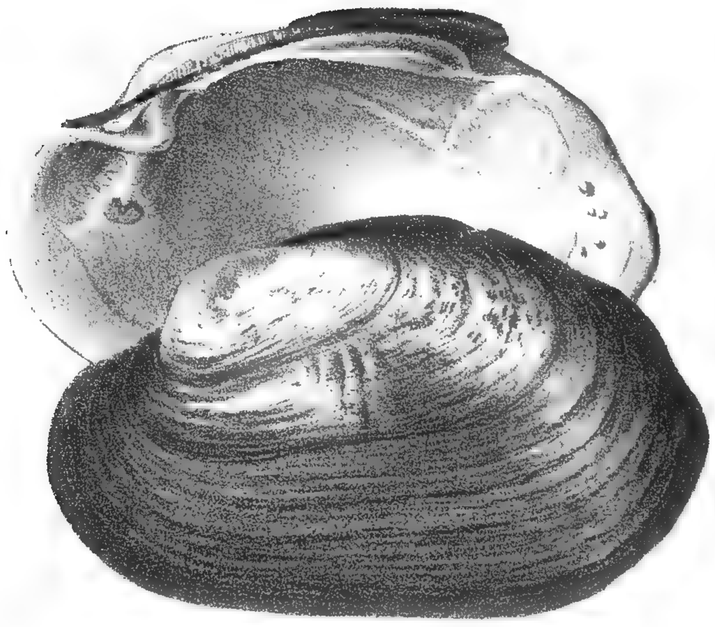
von Zglinicka ad nat. del. et lith.

Impr. O. Hollmann.



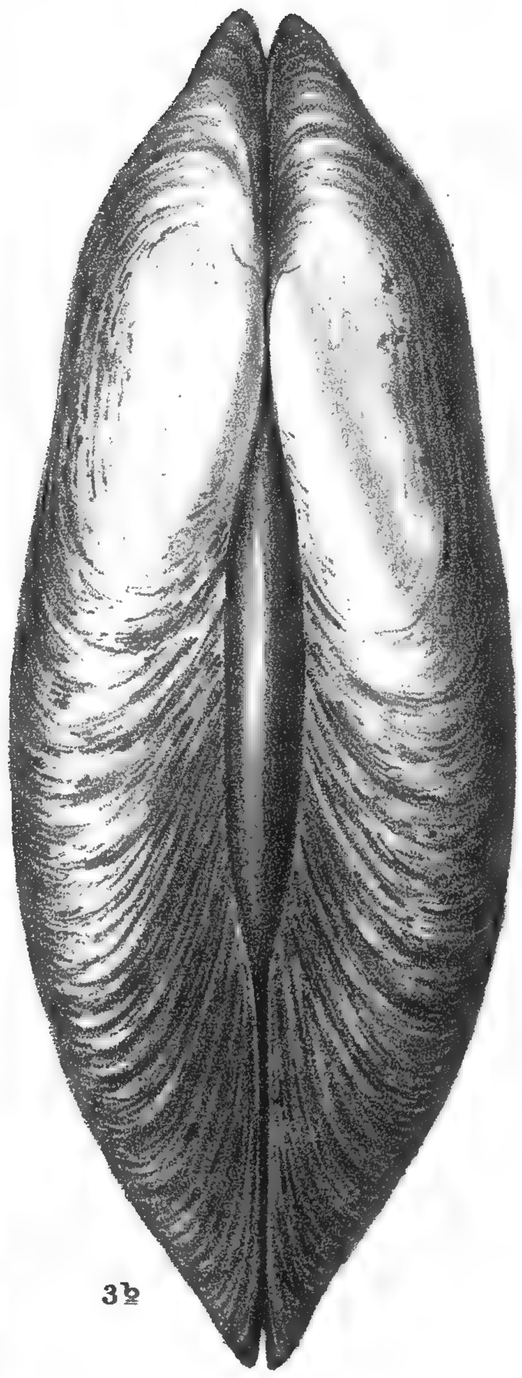
1a

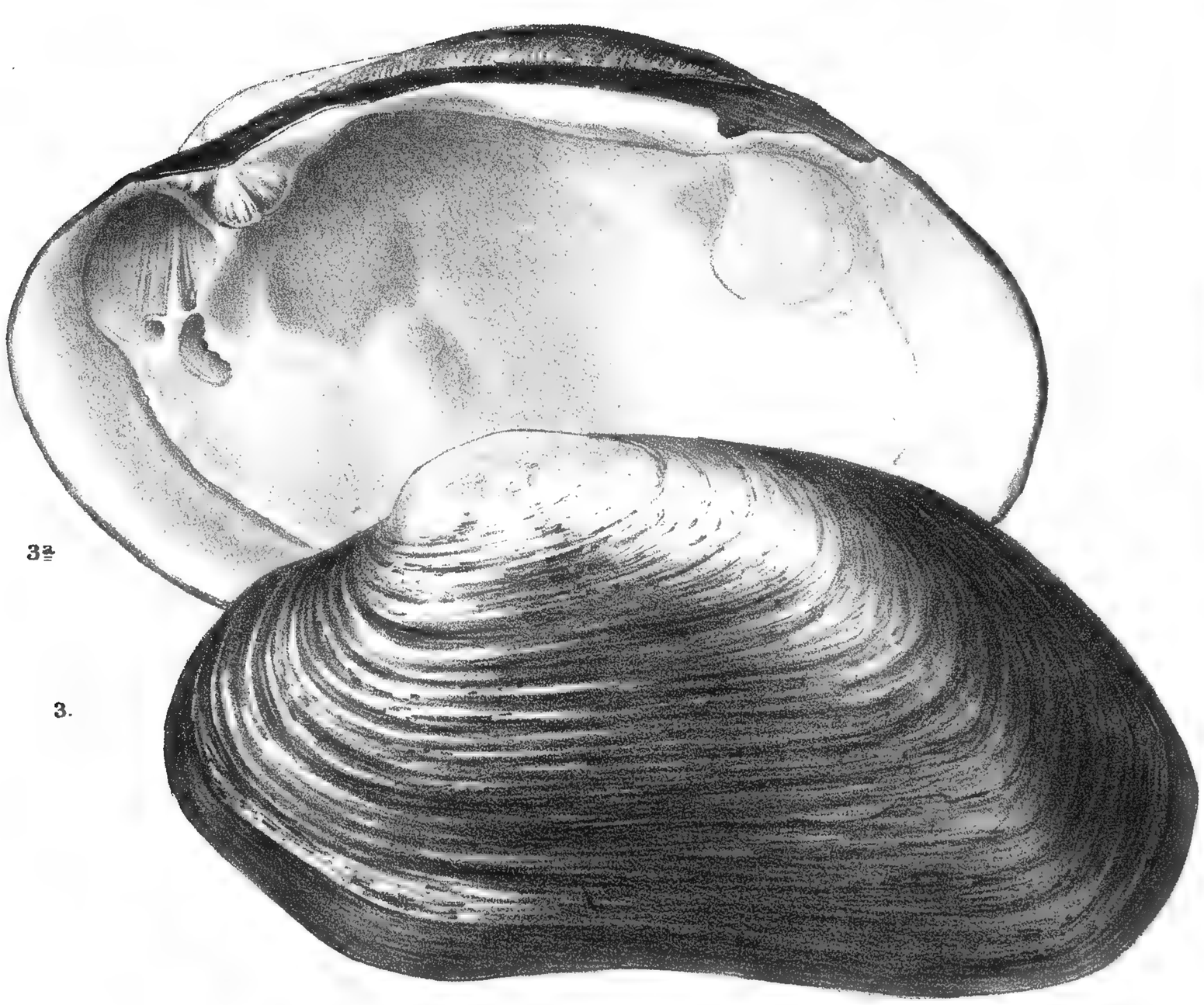
1



2a

2





3a

3.

3b

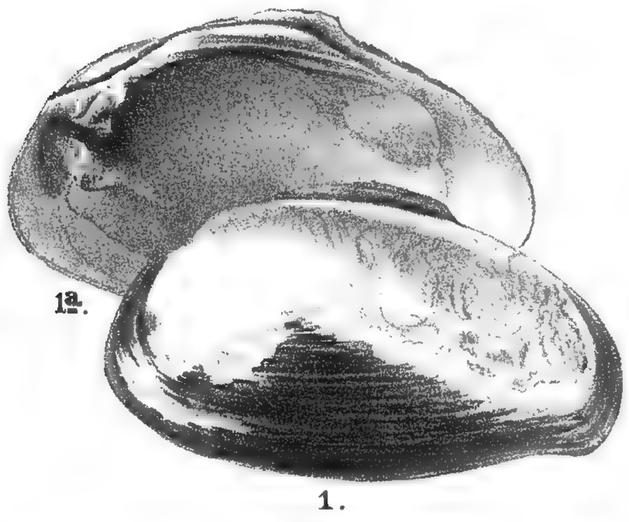
1, 1a UNIO AZTECORUM var. STREBELI.

2, 2a " " " " *juv.*

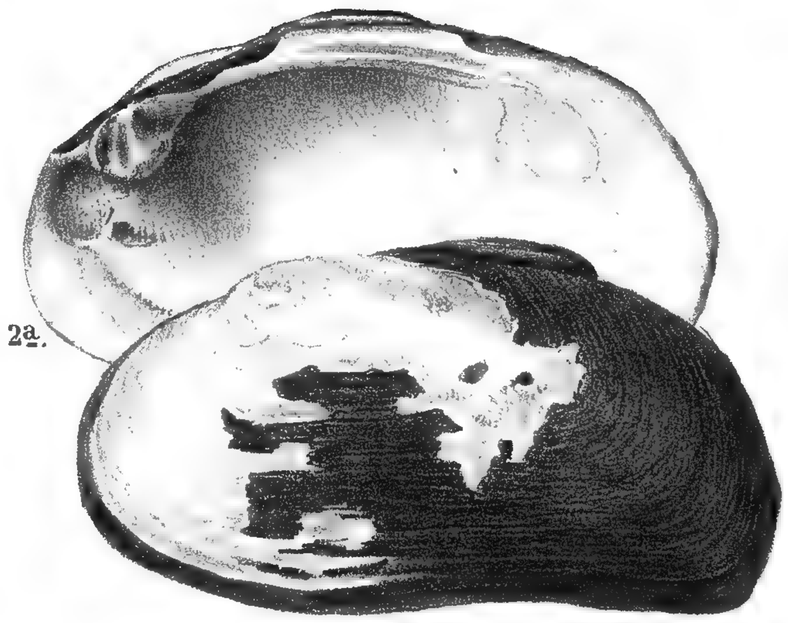
3, 3a, b " " *forma major.*

von Zglinicka ad nat. del. et lith.

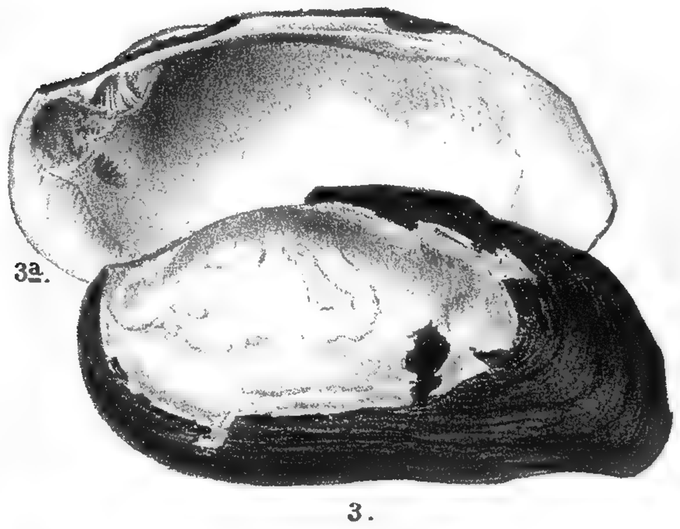
Impr. C. Hellmann


1a.

1.


2a.

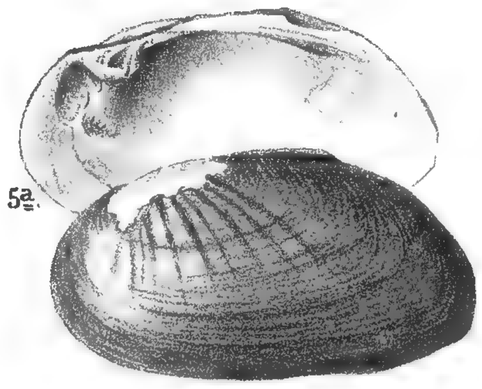
2.


3a.

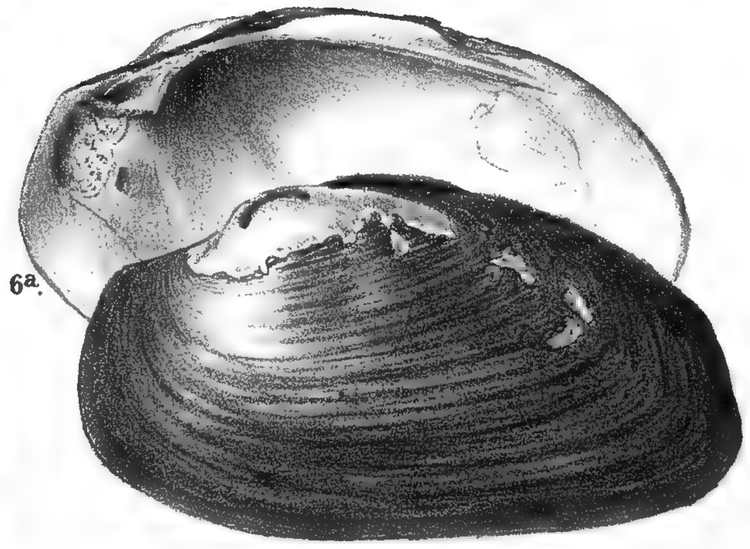
3.

4a.

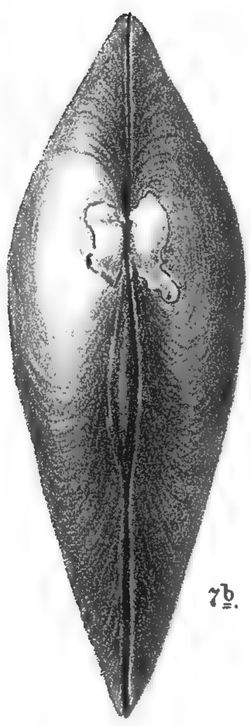
4.

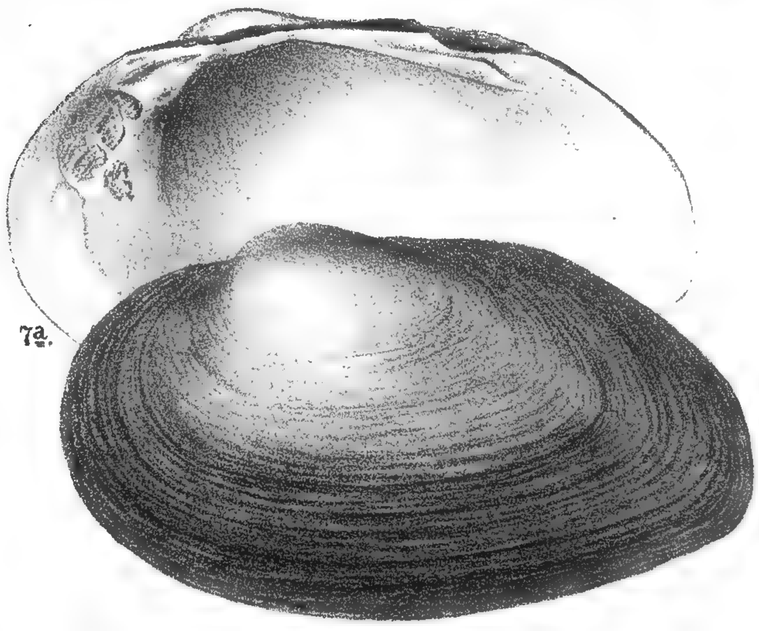

5a.

5.


6a.

6.


7b.


7a.

7.

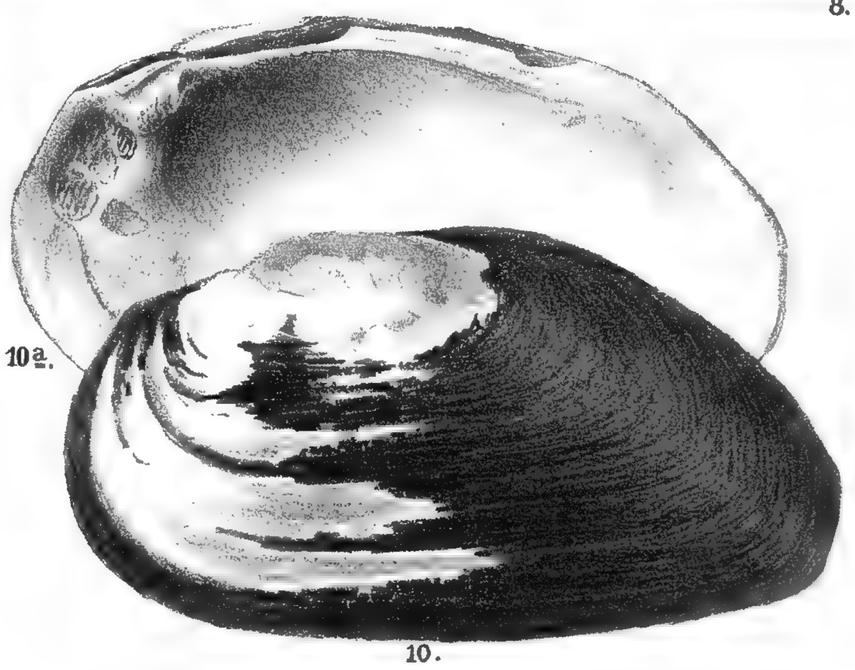
8a.

8.

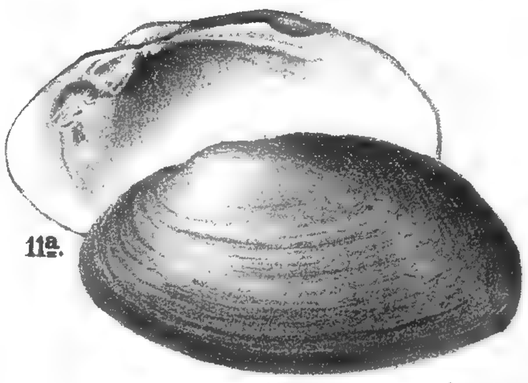
10b.

9a.

9.


10a.

10.


11a.

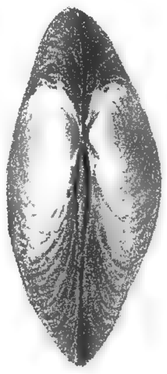
11.

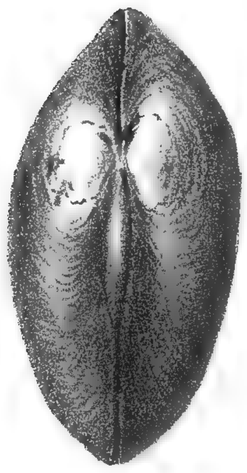
1, 1a.	UNIO RAVISTELLUS,	v. VERAEPACIS.	
2 – 4a.	„	„	
5, 5a.	„	„	*juv.*
6, 6a.	„	„	
7, 7a,b, 8, 8a.	UNIO	GUATEMALANUS.	
9, 9a	„	CHAMPIONI.	
10, 10a, b.	„	GOASCORANENSIS.	
11, 11a.	„	HJALMARSONI.	

von Zglinicka ad nat. del. et lith.

impr. O. Hollmann.

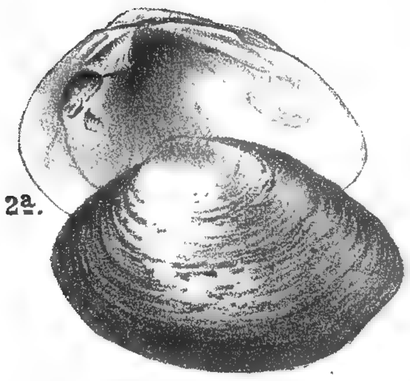
1.

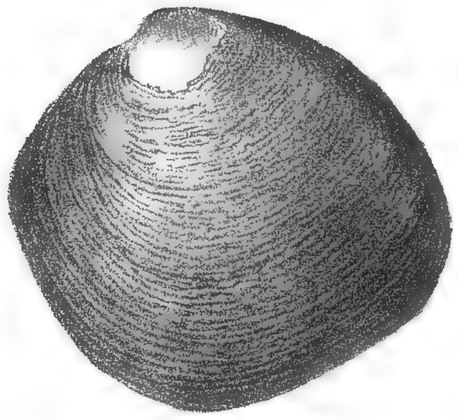

2b.

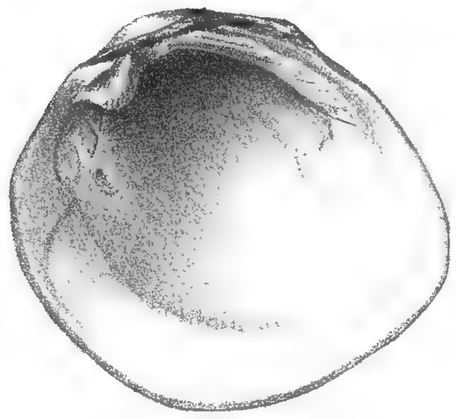

5b.

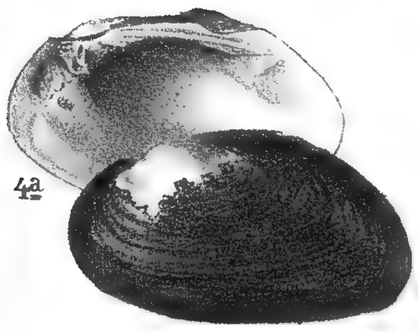
3b.

3a. 3.

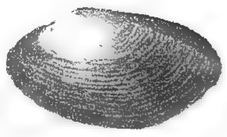

2a. 2.

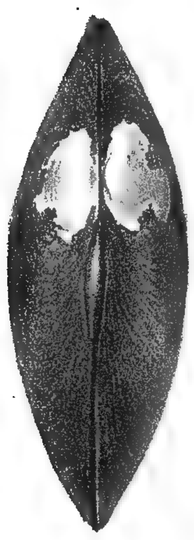

5.

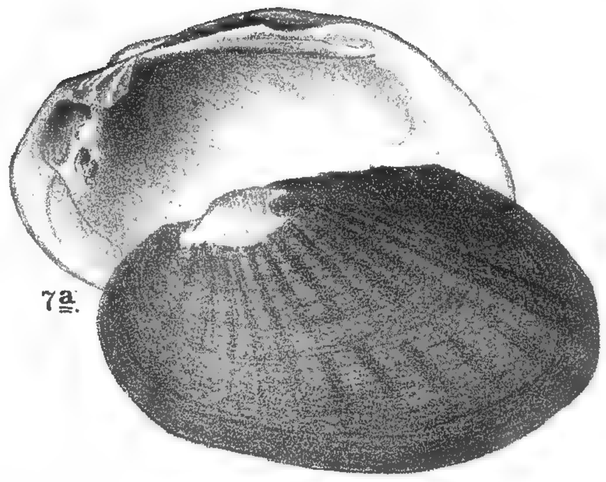

5a.


4a. 4.

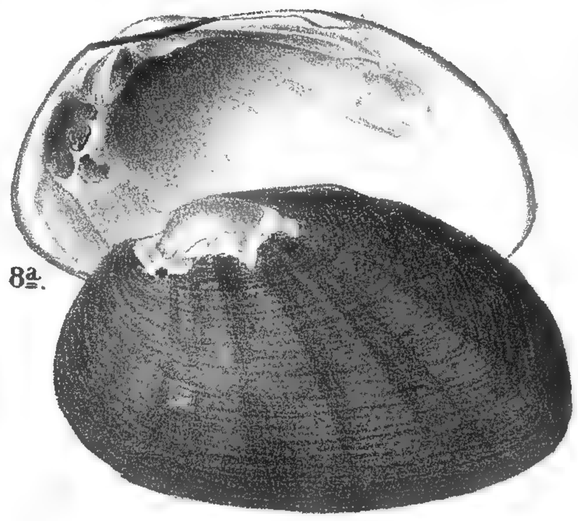
6a.

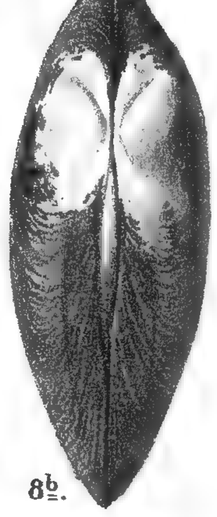

6.

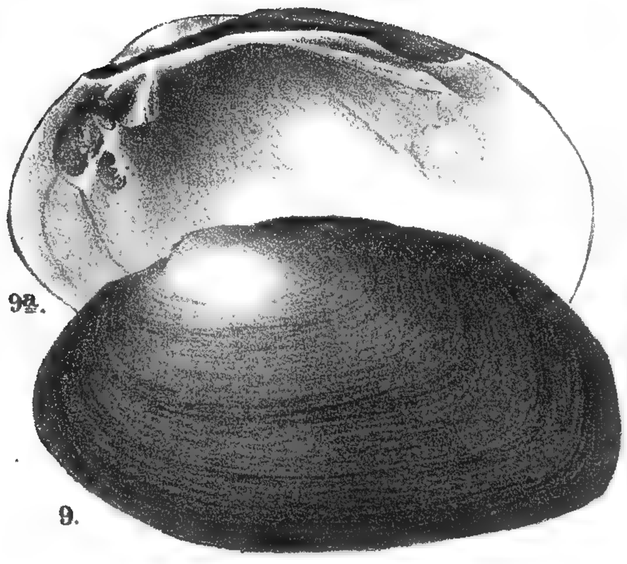

7b.

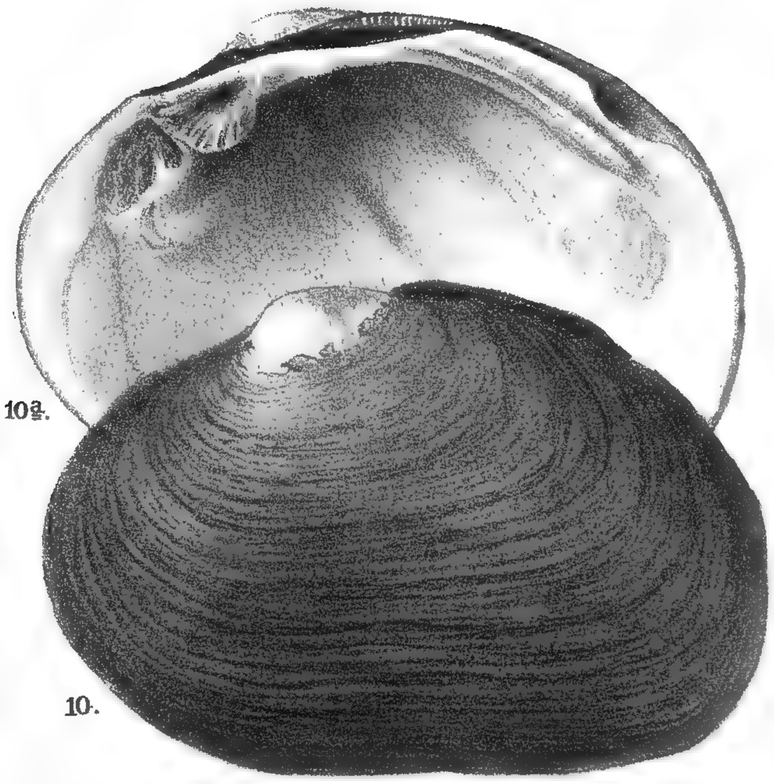

7a. 7.

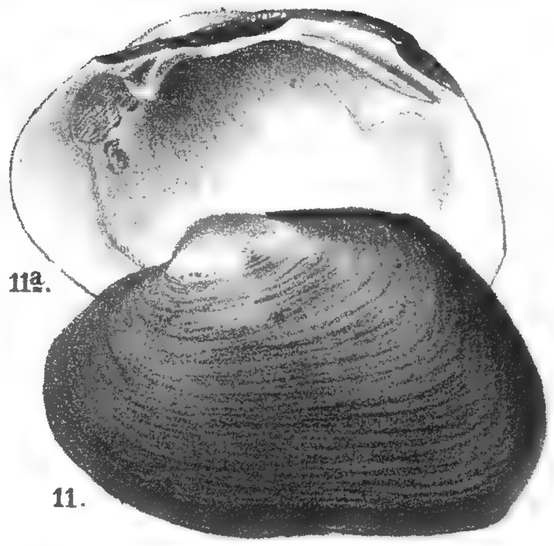
6b.


8a. 8.


8b.


9a. 9.


10a. 10.


11a. 11.

1, 1a,b, 2, 3, 3a,b.	UNIO	ARATUS.
4, 4a.	„	PLICIFERUS, v. MINOR.
5, 5a, b	„	GABBIANUS.
6, 6a, b	„	NUCULINUS.
7, 7a, b.	UNIO	MEDELLINUS.
8, 8a, b.	„	RADIATULUS.
9–11a.	„	YZABALENSIS.

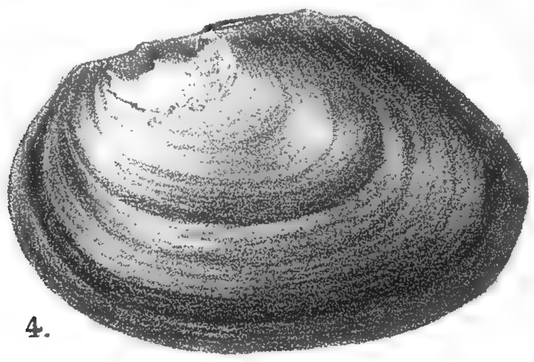
von Zglinicka ad nat. del et lith.

impr. O. Hollmann

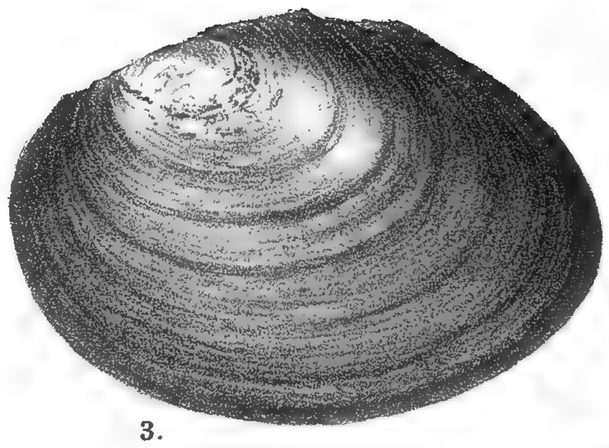
Biol. Centr. Am.

Mollusca. Tab. 40.

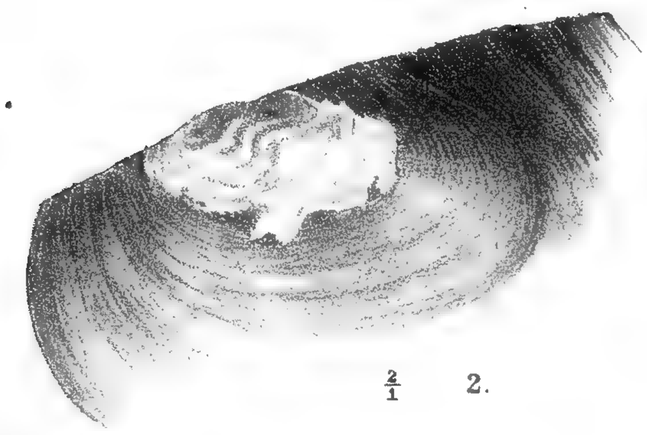
1.



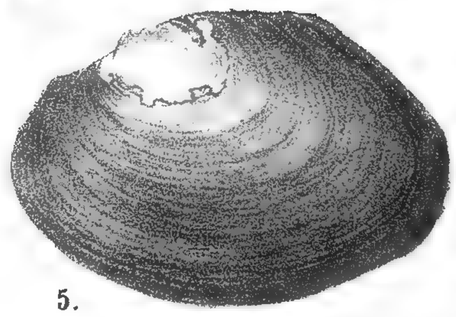
4.



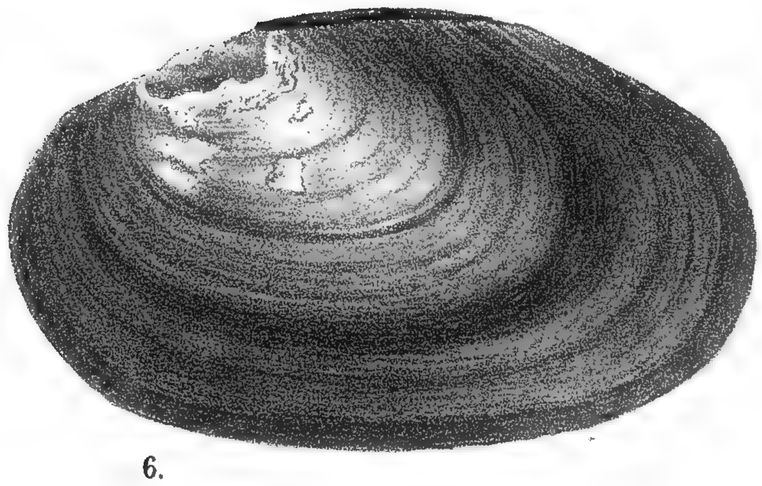
3.



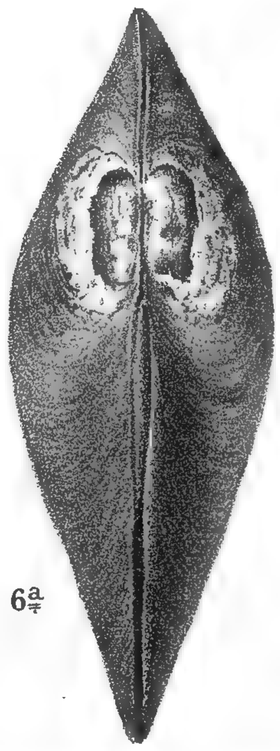
2. $\frac{2}{1}$



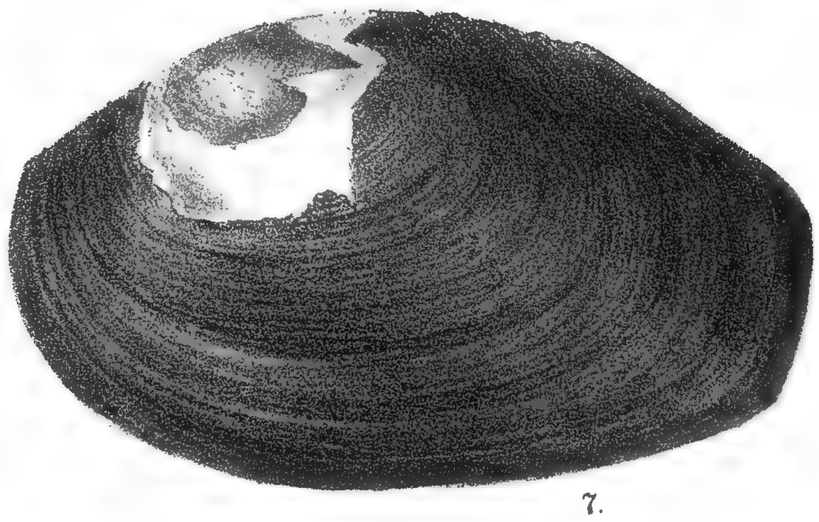
5.



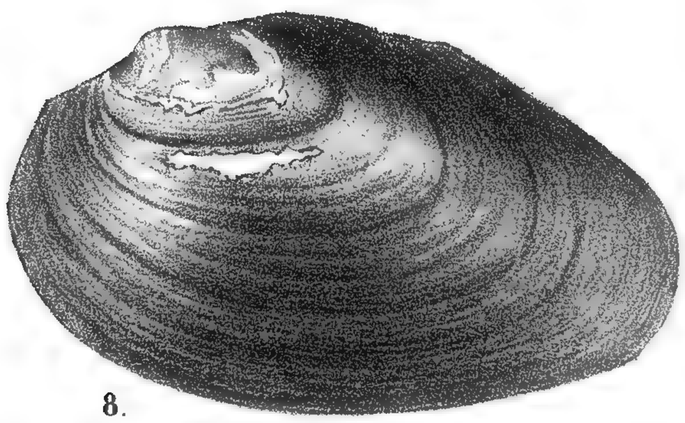
6.



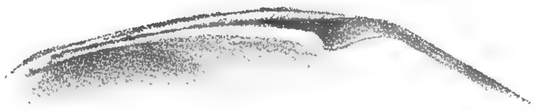
$6\frac{a}{2}$



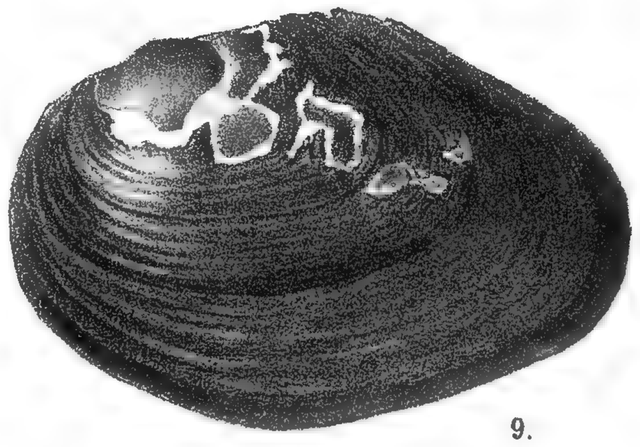
7.



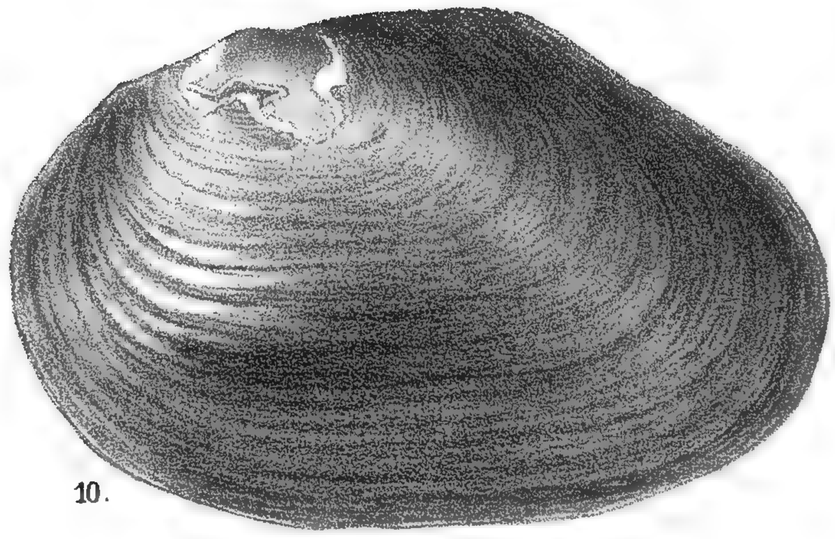
8.



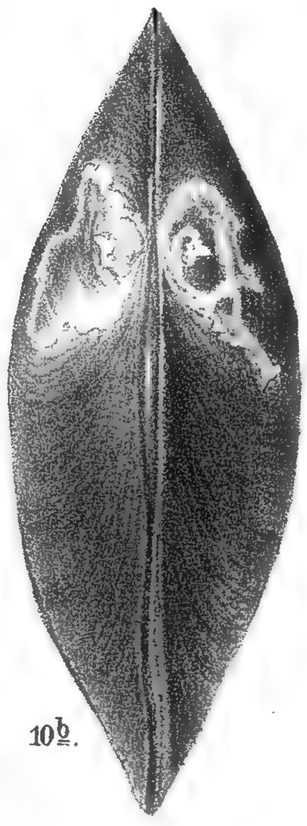
$10\frac{a}{2}$



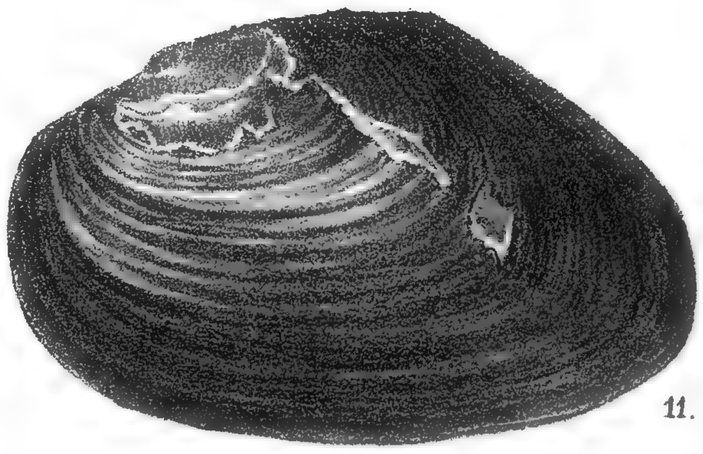
9.



10.



$10\frac{b}{2}$.

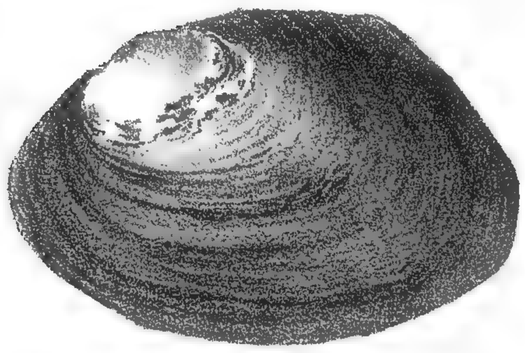


11.

1-7 ANODONTA COARCTATA. 8-11 ANODONTA EXILIOR.

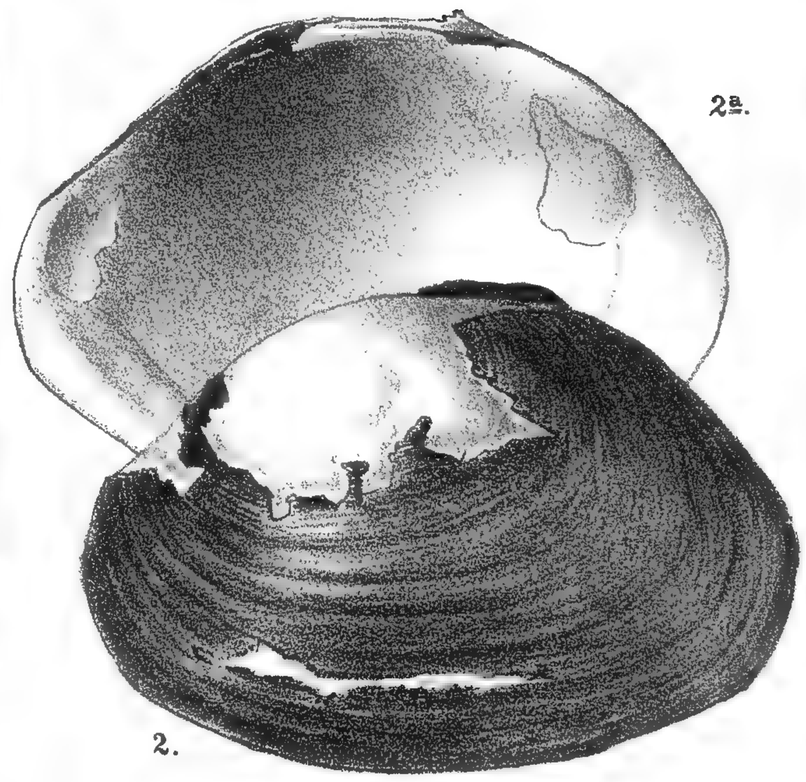
von Zglinicka ad nat del et lith.

Impt. O. Hellmann.



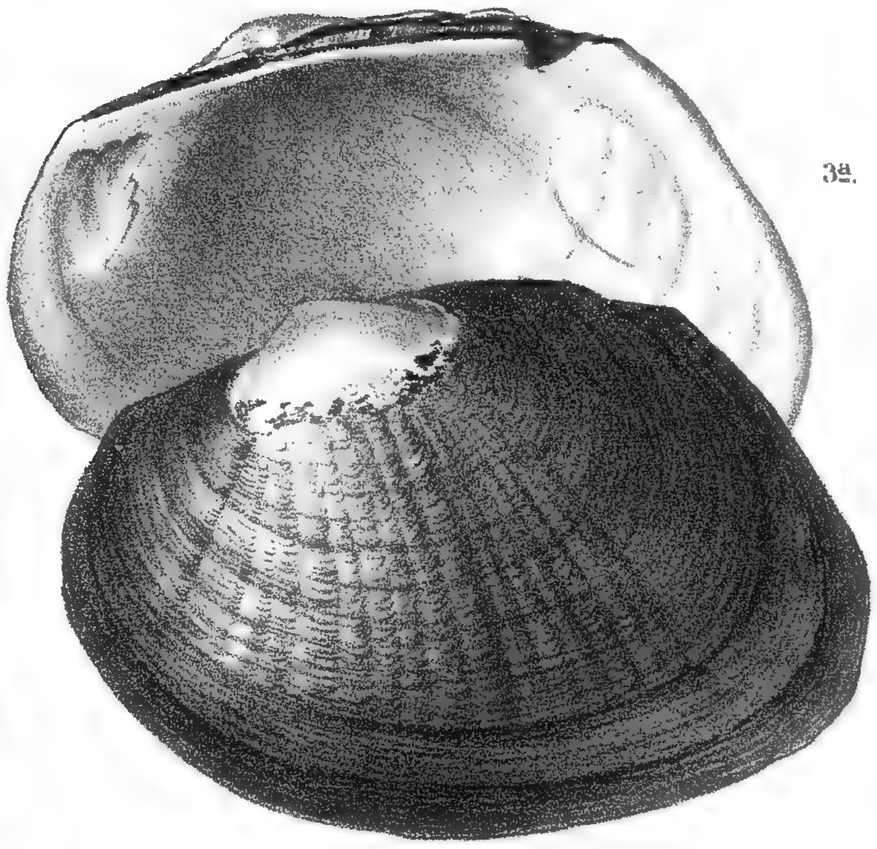
1.

1a.



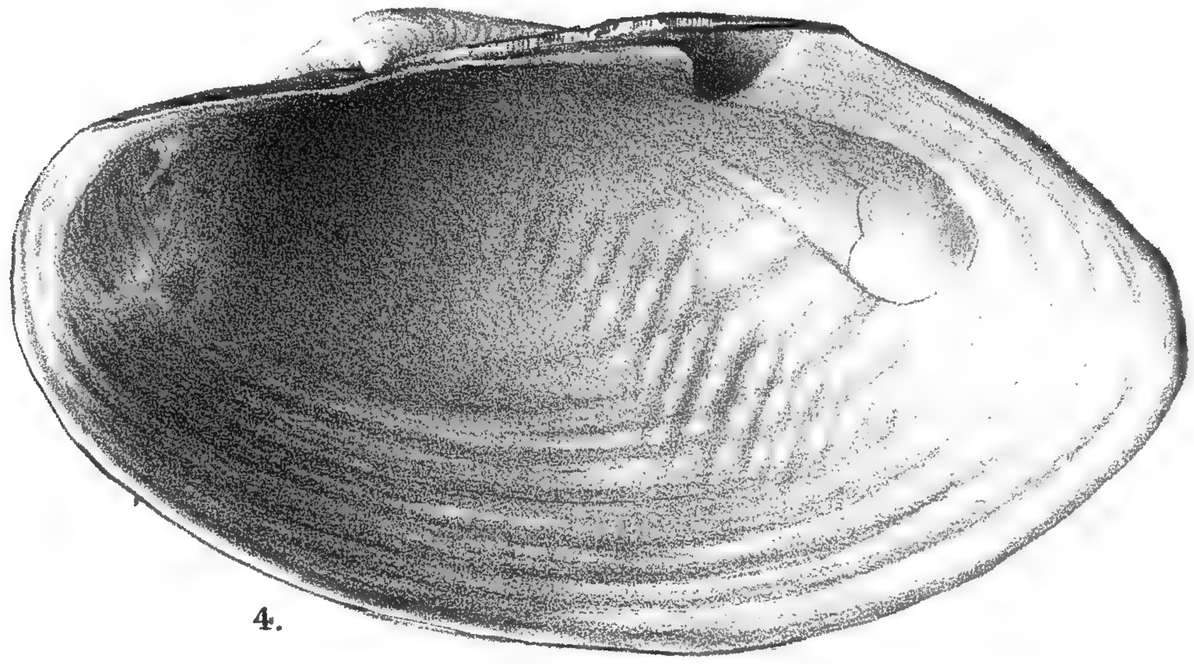
2a.

2.

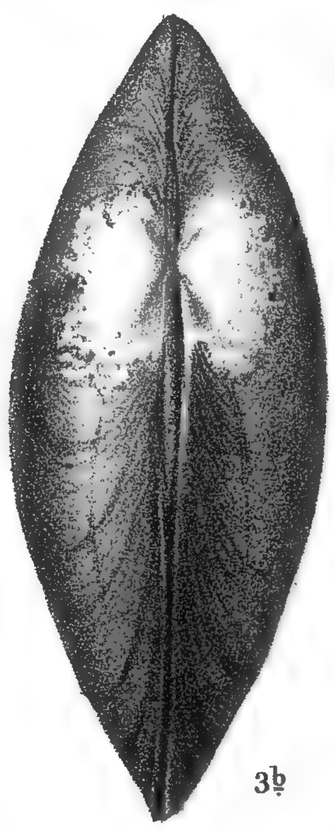


3a.

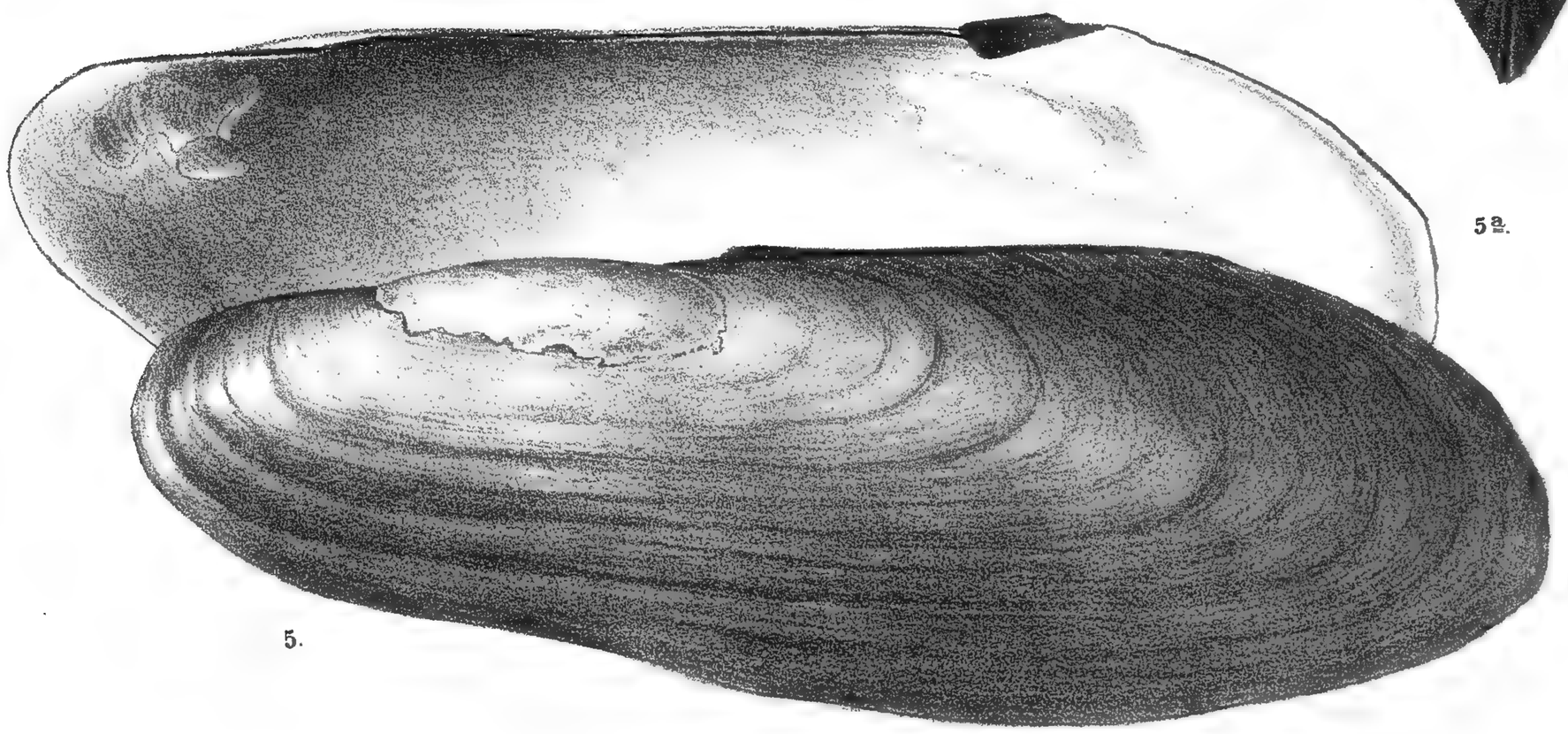
3.



4.



3b.



5a.

5.

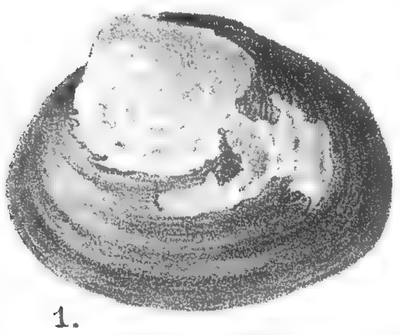
1, 2 ANODONTA RICHARDSONI.
3 „ DEPEXA.
4 ANODONTA CICONIA.
5 MYCETOPUS SUBSINUATUS.

Wm. Zelinicka ad nat. del. et lith.

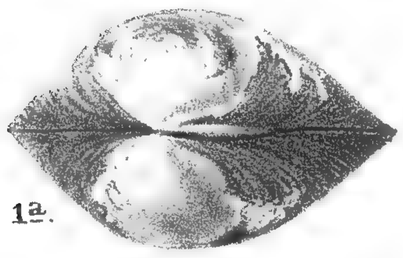
Imp. O. Heinemann.

Biol. Centr. Am.

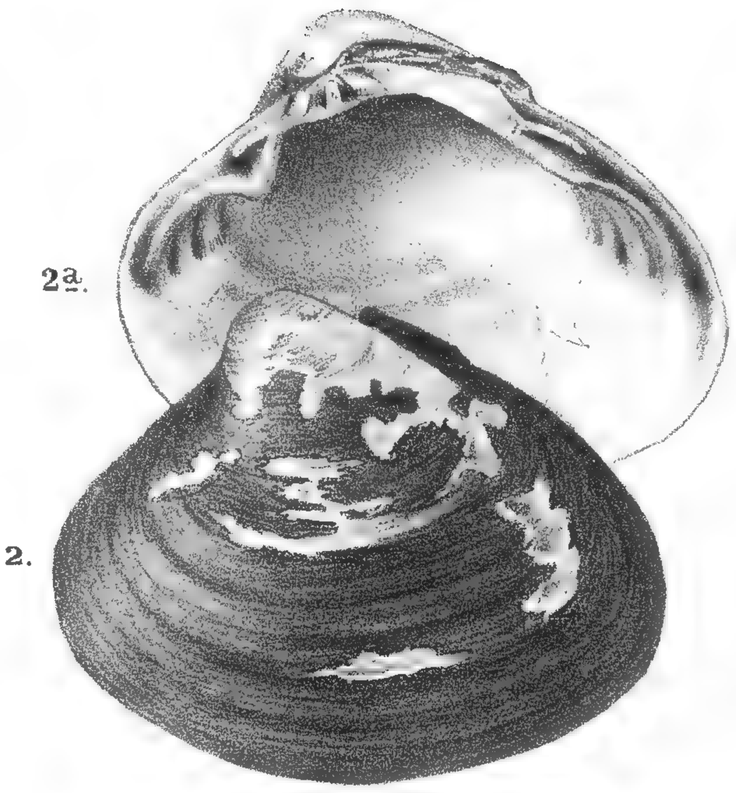
Mollusca. Tab. 42.



1.



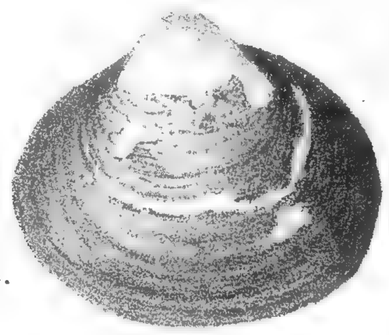
1a.



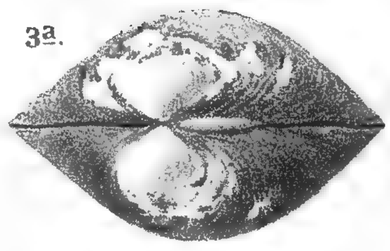
2a.

2.

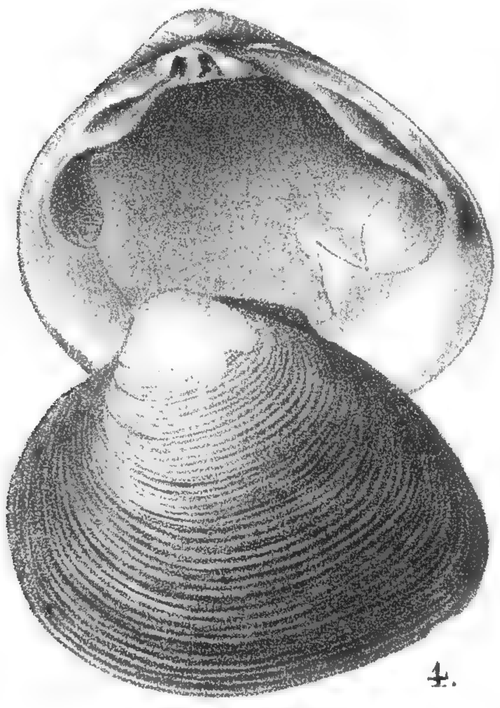
2b.



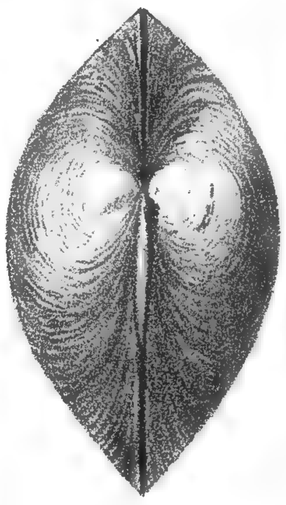
3.



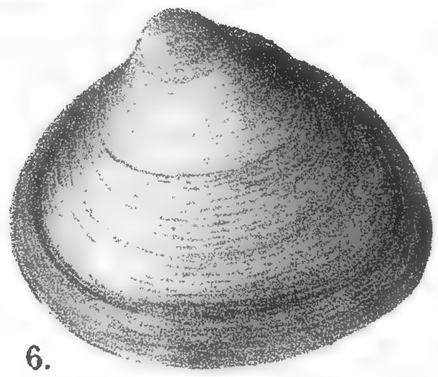
3a.



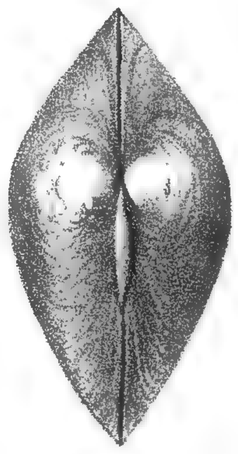
4.



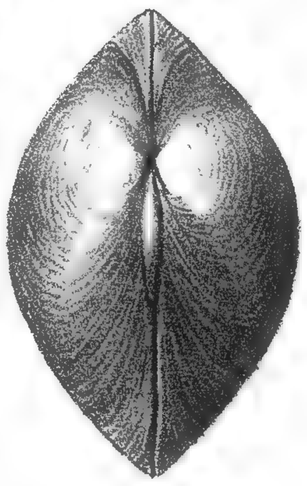
4b.



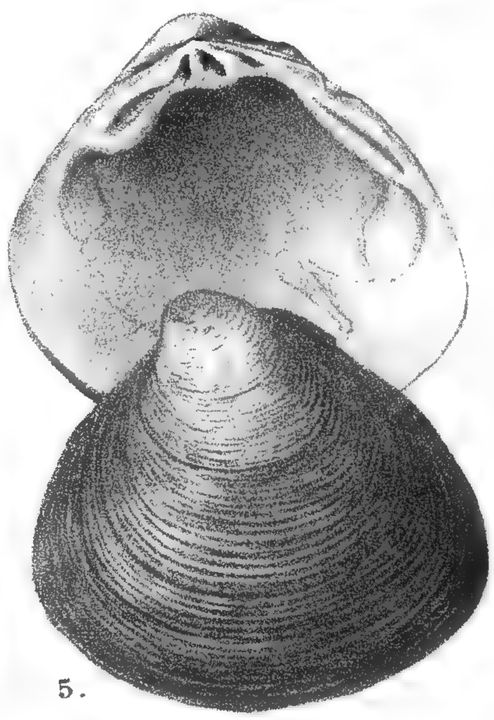
6.



6a.

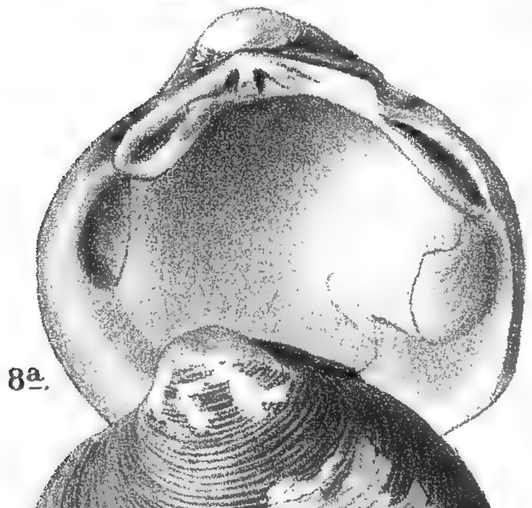


5b.



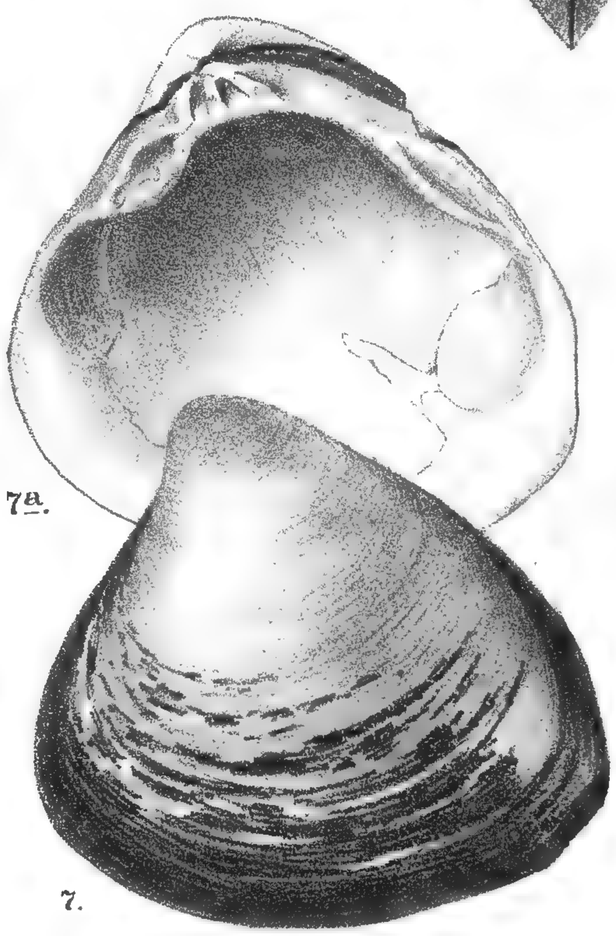
5a.

5.



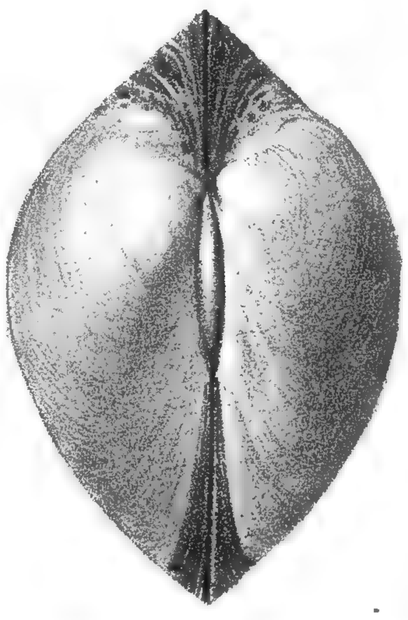
8a.

8.

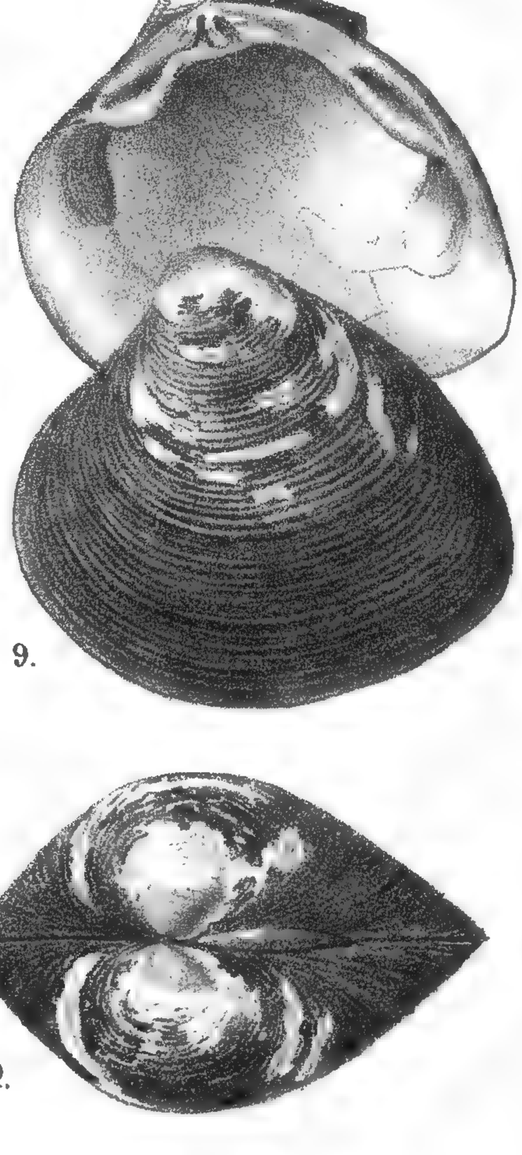


7a.

7.



7b.



9a.

9.

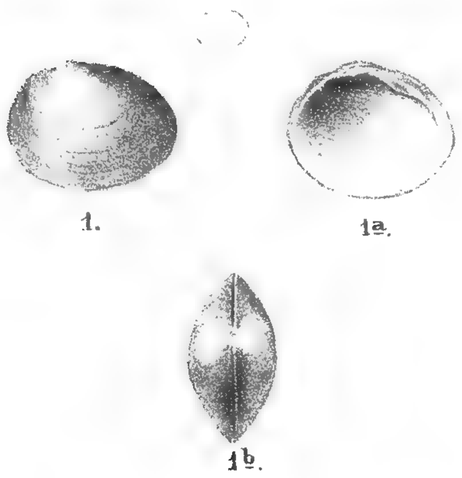
8b.

9b.

1-3 POLYMESODA MEXICANA. 6 POLYMESODA OLIVACEA, *juv.*
4-5 „ PLACENS. 7 „ CORDATA.
8-9 POLYMESODA SOLIDA.

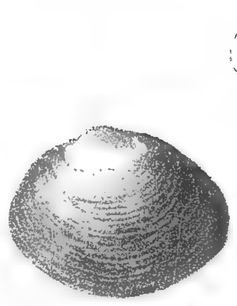
von Zglinicka ad nat. del. et lith.

Impr. C. Hellmann.


1.

1a.

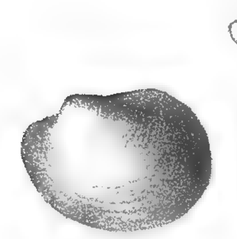
1b.

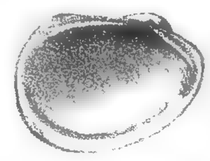

2.

2a.

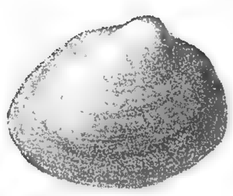
2b.

2c.

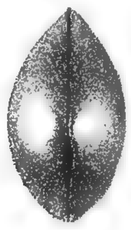

4.


4a.

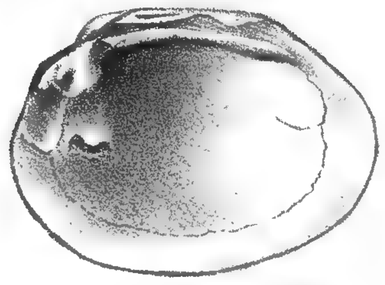
4b.

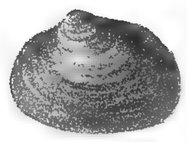

5.

5a.


5b.

6.


6a.

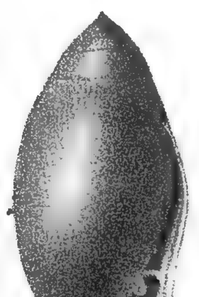

3.

3a.

3b.

8.

6b.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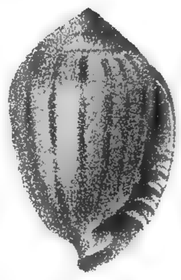
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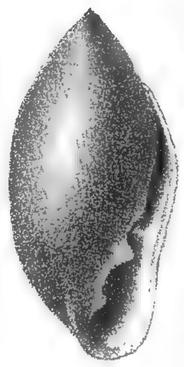
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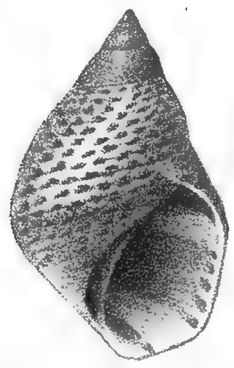
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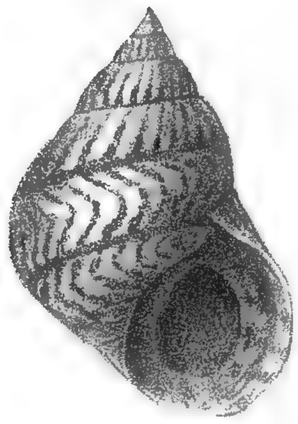
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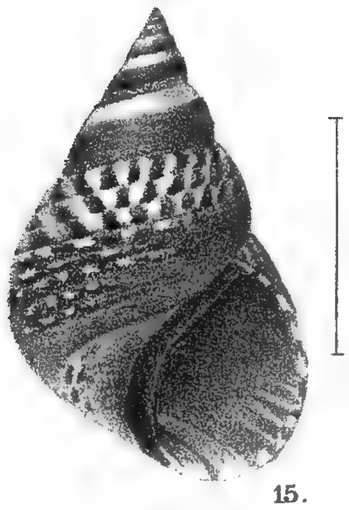
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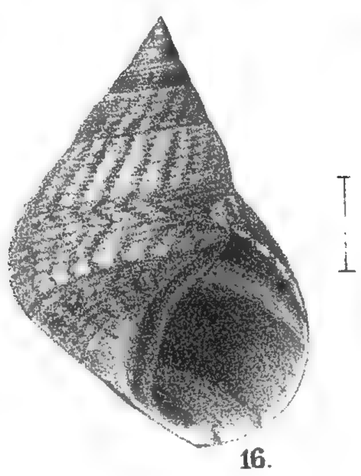
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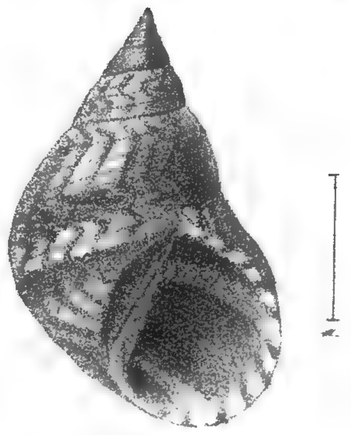
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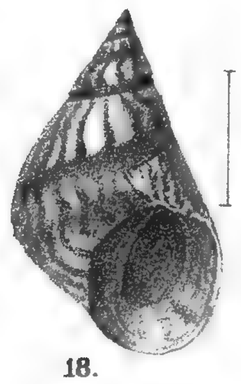
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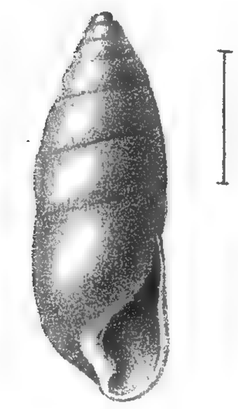
1 SPHAERIUM COSTARICANUM.
2 „ LURIDUM.
4 EUPERA PITTIERI.
5 PISIDIUM ABDITUM.
3 SPHAERIUM MARTENSI
6 UNIO IMBRICATUS.
7 MELAMPUS TRILINEATUS.
8 „ TABOGENSIS.
9 „ STRIGOSUS.
10, 10a „ PANAMENSIS.
11 „ BOCORONICUS.
12. LITTORINA PHILIPPII.
13 LITTORINA PHILIPPII, var. ALBA.
14 „ „ „ PENICILLATA.
15 „ ASPERA.
16 „ „ , juv.
17 „ PHILIPPII, var. SUBSUTURALIS
18 „ „ „ LATISTRIGATA.

von Zgliricka ad nat. del. et lith.

Impr. O. Hellmann.



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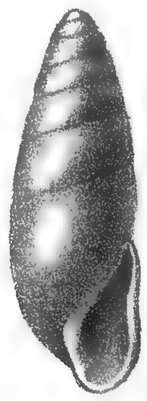

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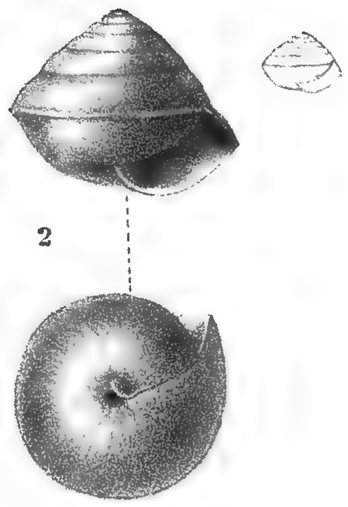

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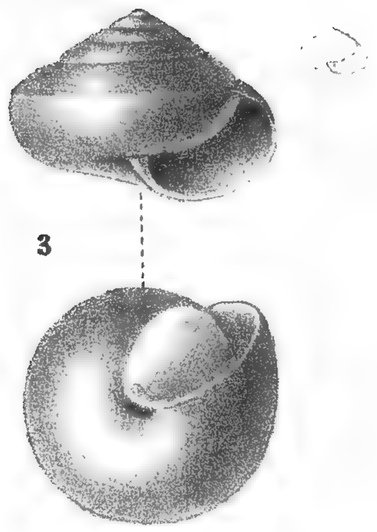

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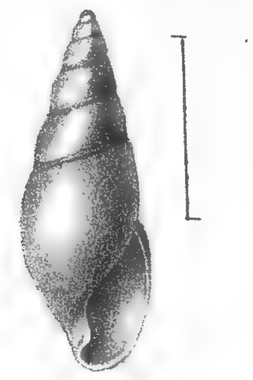

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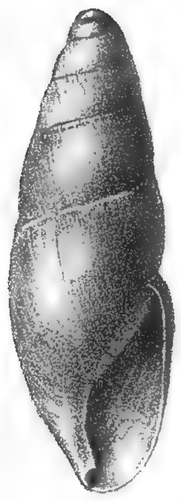

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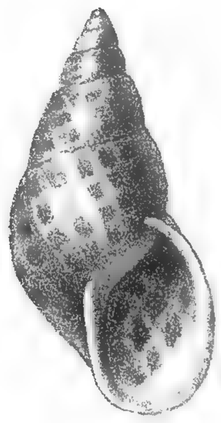

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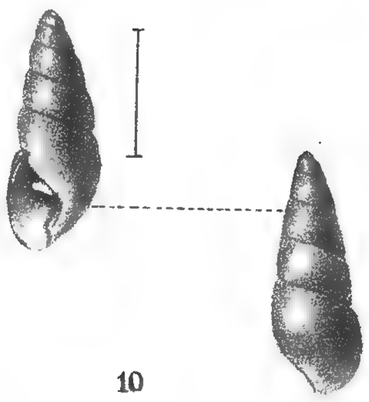

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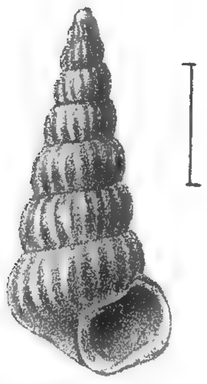

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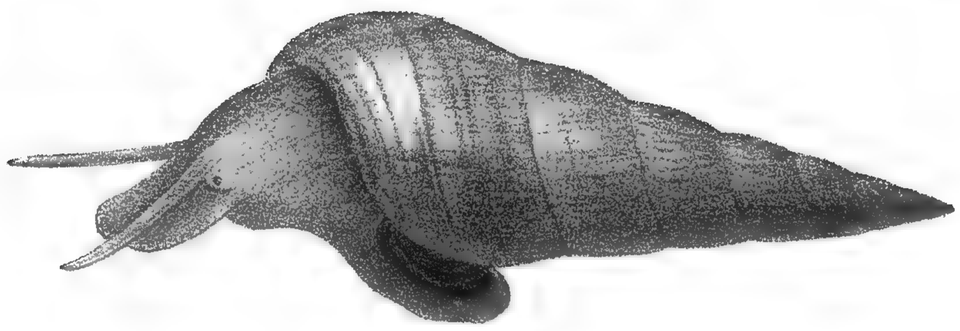

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2 GUPPYA ANGASI.
3 „ MICANS.
4 STREPTOSTYLA SARGI, *var.* CHAMPIONI.
5 GLANDINA PITTIERI.
6 STREPTOSTYLA BICOLOR.
7 HEMISINUS MACULATUS.
8 PACHYCHILUS PILSBRYI.
9 OTOSTOMUS COLIMENSIS.
10 TORNATELLINA PITTIERI.
11,11a POTAMIDES COSTATUS.
12 SUCCINEA GLOBISPIRA.
13 AMNICOLA VULCANI
14 „ STOLLI.
15 ORTALICHUS PRINCEPS, *var.* ELEGANS.
16. ORTALICHUS ZONIFERUS, *var.* NOBILIS.
17 PACHYCHILUS LARGILLIERTI.

von Zglinicka ad nat. del. et lith.

impr. O. Hellmann.

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